

ADTRAN®

MX410/MX412 System Manual

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Revision History

Revision	Date	Description of Changes
A	June 2005	Initial release
B	September 2005	PPP and MX412 information added
C	December 2005	Primary Timing, Secondary Timing, and Cross-connect defaults changed
D	October 2006	Frame Relay added
E	September 2007	Additional Status and Performance Monitoring functionality added.
F	August 2010	Example Data from PM Flat File Updated (Table 5-40).

Conventions

The following typographical conventions are used in this document:

This font indicates a cross-reference link.

This font indicates screen menus, fields, and parameters.

THIS FONT indicates keyboard keys (ENTER, ESC, ALT). Keys that are to be pressed simultaneously are shown with a plus sign (ALT+X indicates that the ALT key and X key should be pressed at the same time).

This font indicates references to other documentation and is also used for emphasis.

`This font` indicates on-screen messages and prompts.

`This font` indicates text to be typed exactly as shown.

This font indicates silkscreen labels or other system label items.

This font is used for strong emphasis.

HAZARD CLASSIFICATIONS

The following hazard classifications are used in this document:

NOTE

Notes inform the user of additional, but essential, information or features.

CAUTION

Cautions inform the user of potential damage, malfunction, or disruption to equipment, software, or environment.

WARNING

Warnings inform the user of potential bodily pain, injury, or death.

Training

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Section 1
Introduction

OVERVIEW

The MX410 (P/N 1189500L1) and MX412 (P/N 1189512L1) systems deliver full DS0 control to service locations, allowing carriers full use of DS1 bandwidth. The MX410 (see Figure 1-1) interfaces to four long-haul outside plant protected DS1s by way of RJ-48 connectors, while the MX412 (see Figure 1-2) interfaces to 12 DS1s. Data and management on the DS1s can be cross connected on a non-blocking per-DS0 basis to any DS1, V.35 port, and four PPP ports. Data Ethernet connectivity is provided through four PPP connections used for Ethernet network extension throughout the network and Telnet-based terminal server ports.

The MX410 houses up to two hot-swappable Power Supply Units (PSU) that provide power redundancy when two units are deployed. At least one PSU (P/N 1189501L1) must be inserted into the MX410 for the system to function. The MX412 has an internal PSU.

See Figure 1-3 and Figure 1-4 for overview diagrams.

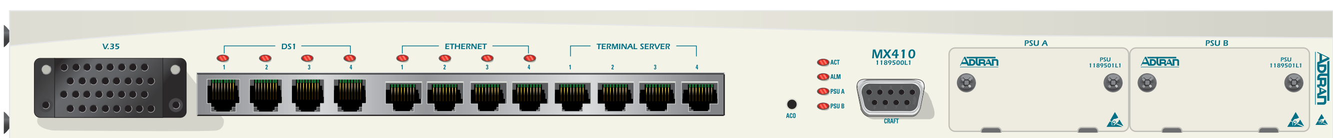


Figure 1-1. MX410 Front Panel

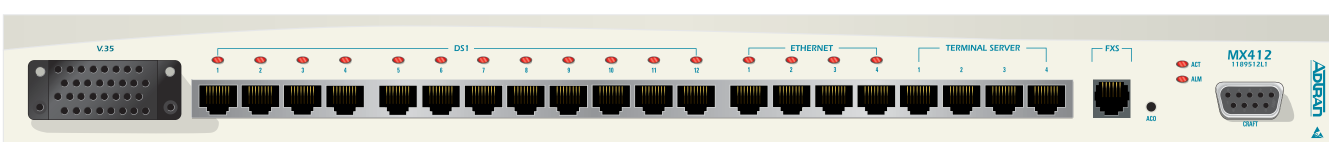


Figure 1-2. MX412 Front Panel

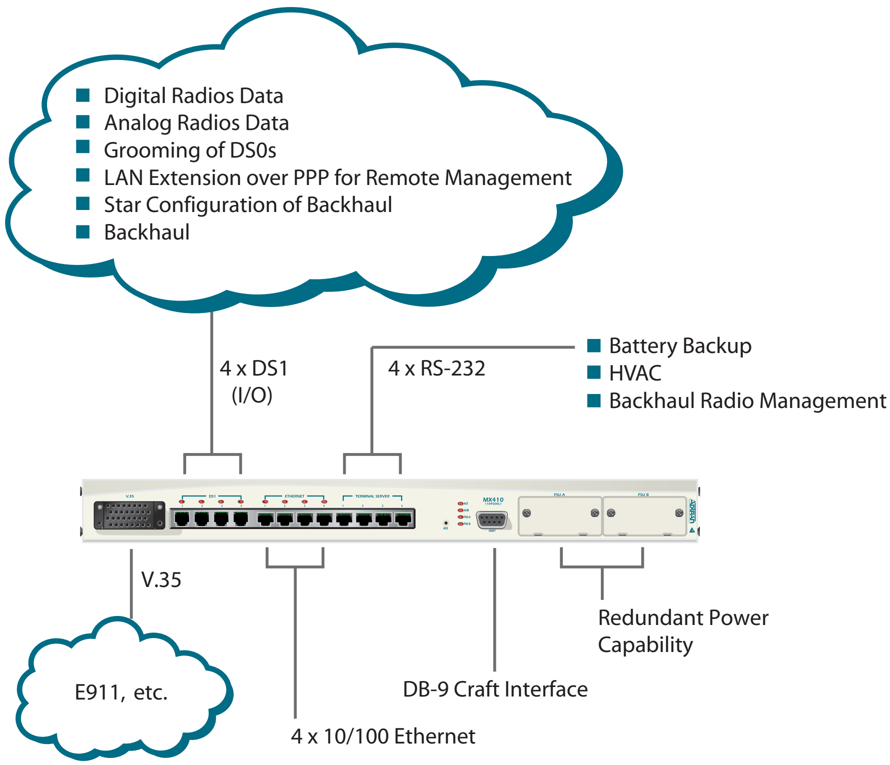


Figure 1-3. MX410 Overview

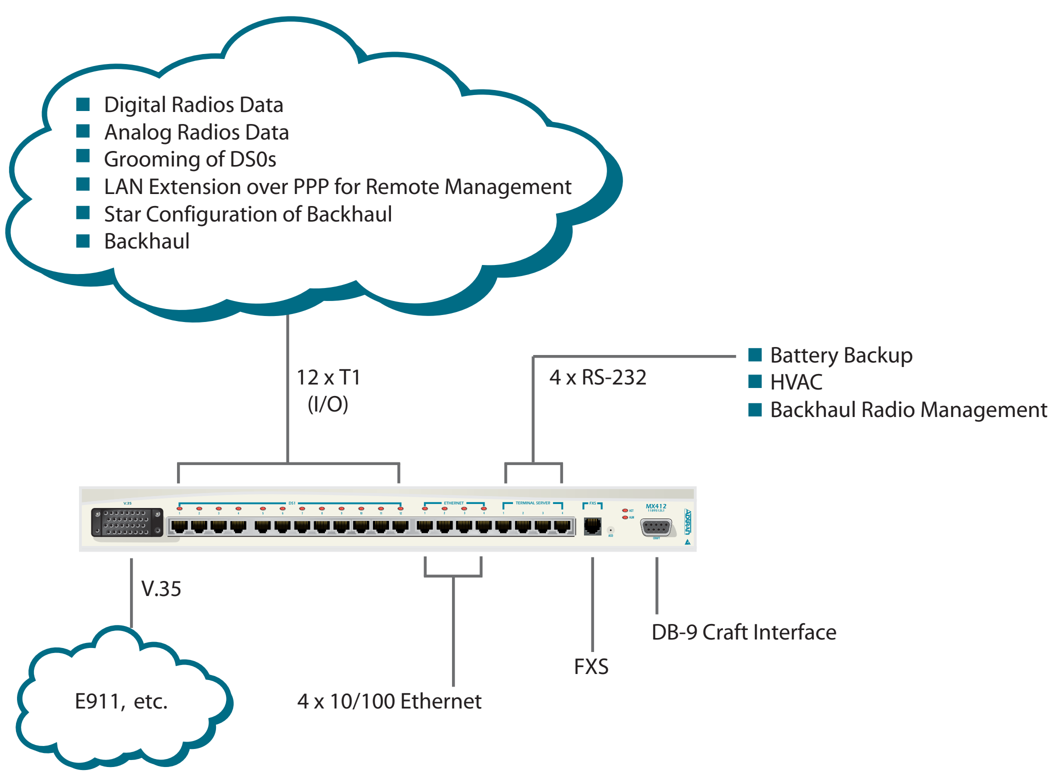


Figure 1-4. MX412 Overview

FEATURES

The major features of the MX410/MX412 are as follows:

- 19-inch wall mounting or rack mounting, one rack unit high
- Front panel data connections
- One V.35 port
- Four RJ-45 long-haul DS1 connections (12 on the MX412) with outside plant protection
- A four-port Ethernet switch
- Non-blocking DS0 cross connect between all DS1 interfaces and the V.35 port
- RJ-45 10Base-T Ethernet connection
- Terminal server functionality
- FXS port (MX412 only)
- DB-9 craft interface for access to Provisioning, Status, Test, and Alarm menus
- Management by Telnet over Ethernet connection or VT100 through a local RS-232, DB-9 craft port
- End-to-end Ethernet extension over multiple T1s
- Robbed Bit Signaling (RBS) supported on a per DS0 basis
- Hot-swappable PSUs with 1:1 redundancy (MX410 only)
- Independent power feeds with separate returns
- Accepts redundant ±60 to ±22 VDC inputs
- Wire-wrap pins for alarms
- Manual and remote initiated loopback modes
- Meets NEBS Level 3
- Comprehensive test features

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Section 2
Engineering Guidelines

GENERAL

This section provides engineering guidelines for network designers who are incorporating an MX410/MX412 into their network.

COMPLIANCE

The MX410/MX412 complies with the requirements covered under UL 60950 and NEBS Level 3. The MX410/MX412 is intended to be installed in a restricted access area only.

The MX410/MX412 complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. The device may not cause harmful interference.
2. The device must accept any interference received, including interference that may cause undesired operation.

Changes and modifications not expressly approved by ADTRAN could void the user's authority to operate this equipment.

WARNING

The V.35, Ethernet, terminal server, craft port, and FXS port (if present) interfaces are not to be connected to outside plant (OSP) facilities.

CAUTION

Per GR-1089-CORE October 2002, Section 9, this system is designed and intended only for installation in a DC-C (common) Bonding and Grounding system. It is not intended or designed for installation in a DC-I (isolated) Bonding and Grounding system. The ground wire must be of equal or greater ampacity than the wire connected to the VDC return.

The Configuration Codes for the MX410/MX412 and the MX410 PSU are provided in Table 2-1 and Table 2-2.

Table 2-1. MX410 and MX412 Configuration Codes

Code	Input	Output
Power Code (PC)	F	C
Telecommunication Code (TC)	X	X
Installation Code (IC)	A	–

Table 2-2. MX410 PSU Configuration Codes

Code	Input	Output
Power Code (PC)	F	C
Telecommunication Code (TC)	–	–
Installation Code (IC)	A	–

POWER REQUIREMENTS

Table 2-3 lists the current draw at –48 VDC (operating range of –42 VDC to –60 VDC) and ±24 VDC (operating range of ±22 VDC to ±27 VDC) with redundant PSUs installed (MX410 only).

Table 2-3. Current Draw at –48 VDC and ±24 VDC

Part Number	Equipment	Maximum Current Draw at –48 VDC	Maximum Current Draw at ±24 VDC
1189500L1	MX410	0.23 amps	0.41 amps
1189512L1	MX412	0.36 amps	0.76 amps

Table 2-4 provides data for determining the recommended fuse for the fuse and alarm panel that services the MX410/MX412.

Table 2-4. Fuse Recommendations

System Voltage	Recommended Fuse
–48 VDC	2 amps, slow-blow
±24 VDC	2 amps, slow-blow

POWER DISSIPATION

Table 2-5 provides the heat dissipation data at –48 VDC (operating range of –42 VDC to –60 VDC) and ±24 VDC (operating range of ±22 VDC to ±27 VDC) with redundant PSUs installed (MX410 only).

Table 2-5. Heat Dissipation at –48 VDC and ±24 VDC

Part Number	Equipment	Heat Dissipation at –48 VDC	Heat Dissipation at ±24 VDC
1189500L1	MX410	11.8 watts	10.5 watts
1189512L1	MX412	17.3 watts	18.2 watts

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Section 3
Application Guidelines

INTRODUCTION

This section describes several applications for the MX410/MX412 system. For each application there is a figure illustrating the application, a list of the equipment needed, and an explanation of the basic setup. The MX410/MX412 block diagram shows the data path of an MX410/MX412 system that implements the following applications:

- "Drop and Continue Application" on page 3-3
- "Drop and Insert Application" on page 3-7
- "Integrated Wireless Access Device or DS0 Grooming" on page 3-12
- "Remote Management of Other Systems using Terminal Server Ports and Ethernet Connectivity" on page 3-18

MX410 DATA PATH BLOCK DIAGRAM

As shown in Figure 3-1, the MX410 contains a 1/0 cross connect that allows DS0s to be mapped between four DS1s (twelve DS1s on the MX412), four PPP ports, and a V.35 port. Refer to "PPP BCP/IPCP Menu" on page 5-38 for more information about using PPP.

Any DS0 in DS1 1 can be mapped to any DS0 in DS1 1-4, any PPP port, or the V.35 port.

Any unmapped DS0 in a DS1 is filled with all ones. Therefore, if an entire T1 is unmapped, framed all ones are sent.

The 1/0 cross-connect default mapping of the DS1s is odd to even ports (for example, DS1 1 is mapped to DS1 2). By default, DS0s are not dropped to the PPP or V.35 ports.

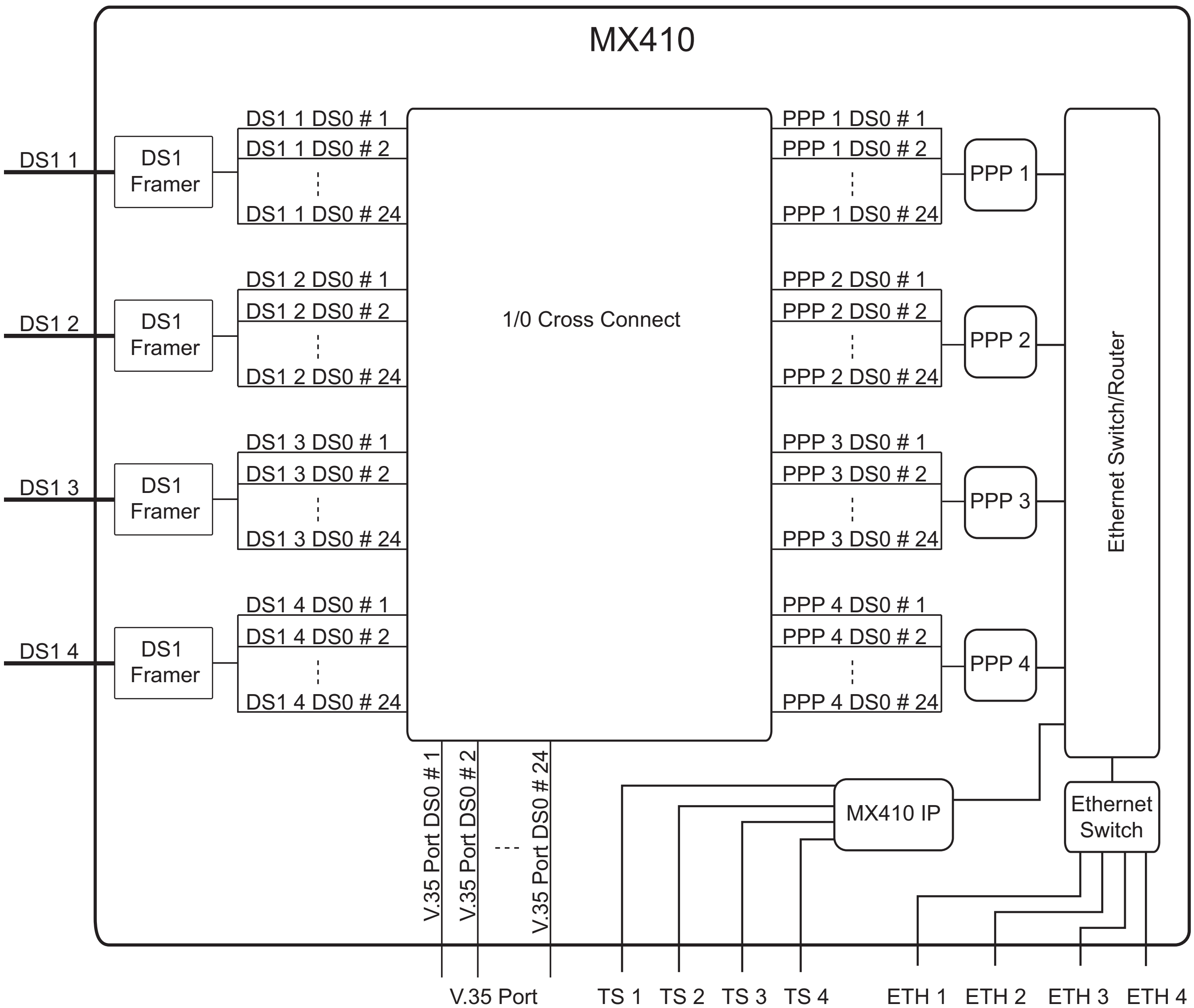


Figure 3-1. MX410 Data Path Block Diagram

Drop and Continue Application

The following applies to Remote Site #1 shown in Figure 3-2. In the Drop and Continue Application, any combination of DS0s from one DS1 can be dropped out the other DS1 ports with the remaining DS0s continuing through to the other DS1 interface. This enables the bandwidth of one DS1 to deliver DS0s to several sites using one MX410 at each site.

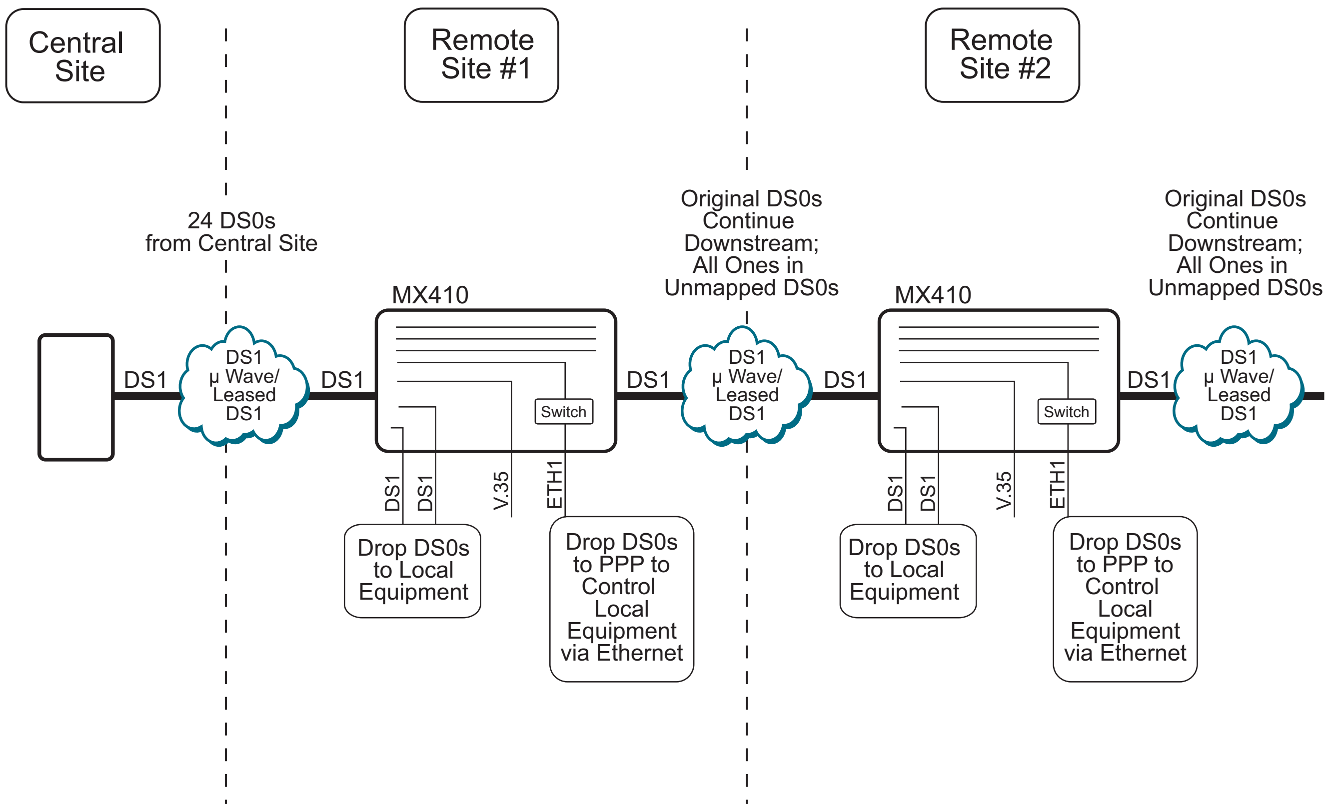


Figure 3-2. Drop and Continue Application Diagram

The equipment needed for a Drop and Continue application is shown in Table 3-1.

Table 3-1. Drop and Continue Application (Required Equipment Per Site)

Part Number	Equipment	Quantity
1189500L1 or 1189512L1	MX410 MX412	1 1
1189501L1	MX410 PSU (MX410 only)	1 (2 for redundancy)

Setup

Connect the incoming DS1 (the DS1 from which the DS0s are dropped) to the DS1 1 RJ Connector. Connect the outgoing DS1 to the DS1 2 RJ Connector. Connect the other DS1s using the RJ connector on the front panel. For more information, refer to "DS1 Ports" on page 4-6.

Starting from the default mapping, the DS0s can be dropped using the Quick Setup menu to the PPP and V.35 ports (see Figure 3-3). Select each port (PPP1-4, V.35) to which a DS0 needs to be dropped from the incoming DS1. For each port, select the range of DS0s in DS1 1 to be dropped to that port. A screen confirming removal of the current connections will be displayed. Choose Yes to remove the default settings and then choose Apply again for the new connections to be applied. To drop DS0s to the other DS1 ports, use the Quick Setup menu to navigate to the Cross-Connect Mapping menu. If robbed bit signaling is needed, select the Map Multiple DS0's option and then select the range of DS0 and DS1 1 to be dropped to DS1 2 with Robbed Bit Signaling enabled.

Any un-mapped DS0s from the incoming DS1 will transmit All Ones. The incoming DS1 does not have to be DS1 1, but is used only as an example.

The following four figures show an example of setting up a drop and continue application. Figure 3-3 shows the Quick Setup menu before any DS0s have been dropped.

```
                                      MX410                            MM/DD/YY HH:MM
Active Alarms: CRITICAL                MINOR              ID:                   MX410


                                   Quick Setup
 Ports
  1 - PPPs                                9 - Frame Relay




  2 - V.35  =

 System
  3 - System ID
  4 - IP Address          : 192.168.100.1
      Subnet Mask         : 255.255.0.0
  5 - Default Gateway     : 192.168.1.1
  6 - Date
  7 - Time                                8 - Cross-Connect Mapping


  Selection :                                         '?' - System Help Screen
```

Figure 3-3. Quick Setup Menu

Figure 3-4 shows the Quick Setup menu after DS0s 21-22 have been dropped from DS1 1 to PPP1, DS0s 23-24 have been dropped from DS1 1 to the V.35 port.

```
                                     MX410                        MM/DD/YY HH:MM
Active Alarms: CRITICAL               MINOR              ID:               MX410


                                  Quick Setup
 Ports
  1 - PPPs
      PPP 1 = DS1 1 DS0 #21-22



  2 - V.35  = DS1 1 DS0 #23-24

 System
  3 - System ID
  4 - IP Address           : 192.168.100.1
      Subnet Mask          : 255.255.0.0
  5 - Default Gateway      : 192.168.1.1
  6 - Date
  7 - Time                                8 - Cross-Connect Mapping


  Selection :                                          '?' - System Help Screen
```

Figure 3-4. Drop and Continue Quick Setup - Example

Figure 3-5 shows the DS1 1 Cross-Connect Mapping menu after the PPP1 and V.35 interface have been mapped.

```
                                     MX410                        MM/DD/YY HH:MM
Active Alarms: CRITICAL                                  ID:               MX410


                             Cross-Connect Mapping
       DS1 1

  1 - DS0 #1  = DS1 2 DS0 #1             13 - DS0 #13 = DS1 2 DS0 #13
  2 - DS0 #2  = DS1 2 DS0 #2             14 - DS0 #14 = DS1 2 DS0 #14
  3 - DS0 #3  = DS1 2 DS0 #3             15 - DS0 #15 = DS1 2 DS0 #15
  4 - DS0 #4  = DS1 2 DS0 #4             16 - DS0 #16 = DS1 2 DS0 #16
  5 - DS0 #5  = DS1 2 DS0 #5             17 - DS0 #17 = DS1 2 DS0 #17
  6 - DS0 #6  = DS1 2 DS0 #6             18 - DS0 #18 = DS1 2 DS0 #18
  7 - DS0 #7  = DS1 2 DS0 #7             19 - DS0 #19 = DS1 2 DS0 #19
  8 - DS0 #8  = DS1 2 DS0 #8             20 - DS0 #20 = DS1 2 DS0 #20
  9 - DS0 #9  = DS1 2 DS0 #9             21 - DS0 #21 = PPP 1
 10 - DS0 #10 = DS1 2 DS0 #10            22 - DS0 #22 = PPP 1
 11 - DS0 #11 = DS1 2 DS0 #11            23 - DS0 #23 = V.35
 12 - DS0 #12 = DS1 2 DS0 #12            24 - DS0 #24 = V.35

  (T)oggle View (DS1 2, DS1 3, DS1 4, Ports)      25 - Map Multiple DS0's

  Selection :                                          '?' - System Help Screen
```

Figure 3-5. Drop and Continue Cross-Connect Mapping - Example 1

Figure 3-6 shows the Cross-Connect Mapping menu after the remaining DS0s have been continued to DS1 2 as well as four DS0s (13-16) dropped to DS1 3 (1-4) and four other DS0s (17-20) dropped to DS1 4 (1-4).

```
                                     MX410                            MM/DD/YY HH:MM
Active Alarms: CRITICAL               MINOR             ID:                    MX410


                             Cross-Connect Mapping
       DS1 1

  1 - DS0 #1  = DS1 2 DS0 #1            13 - DS0 #13 = DS1 3 DS0 #1
  2 - DS0 #2  = DS1 2 DS0 #2            14 - DS0 #14 = DS1 3 DS0 #2
  3 - DS0 #3  = DS1 2 DS0 #3            15 - DS0 #15 = DS1 3 DS0 #3
  4 - DS0 #4  = DS1 2 DS0 #4            16 - DS0 #16 = DS1 3 DS0 #4
  5 - DS0 #5  = DS1 2 DS0 #5            17 - DS0 #17 = DS1 4 DS0 #1
  6 - DS0 #6  = DS1 2 DS0 #6            18 - DS0 #18 = DS1 4 DS0 #2
  7 - DS0 #7  = DS1 2 DS0 #7            19 - DS0 #19 = DS1 4 DS0 #3
  8 - DS0 #8  = DS1 2 DS0 #8            20 - DS0 #20 = DS1 4 DS0 #4
  9 - DS0 #9  = DS1 2 DS0 #9            21 - DS0 #21 = PPP 1
 10 - DS0 #10 = DS1 2 DS0 #10           22 - DS0 #22 = PPP 1
 11 - DS0 #11 = DS1 2 DS0 #11           23 - DS0 #23 = V.35
 12 - DS0 #12 = DS1 2 DS0 #12           24 - DS0 #24 = V.35

  (T)oggle View (DS1 2, DS1 3, DS1 4, Ports)      25 - Map Multiple DS0's

  Selection :                                         '?' - System Help Screen
```

Figure 3-6. Drop and Continue Cross-Connect Mapping - Example 2

Drop and Insert Application

The following applies to Remote Site #1 shown in Figure 3-7. In the Drop and Insert Application DS0s from one DS1 can be dropped out to the other DS1 ports. Then DS0s from the other DS1 ports can be inserted into the corresponding DS0s in the other DS1. In the example shown, any DS0 not dropped will be mapped to continue on from one DS1 to another. This allows a DS1 to be used to transport DS0s between several sites.

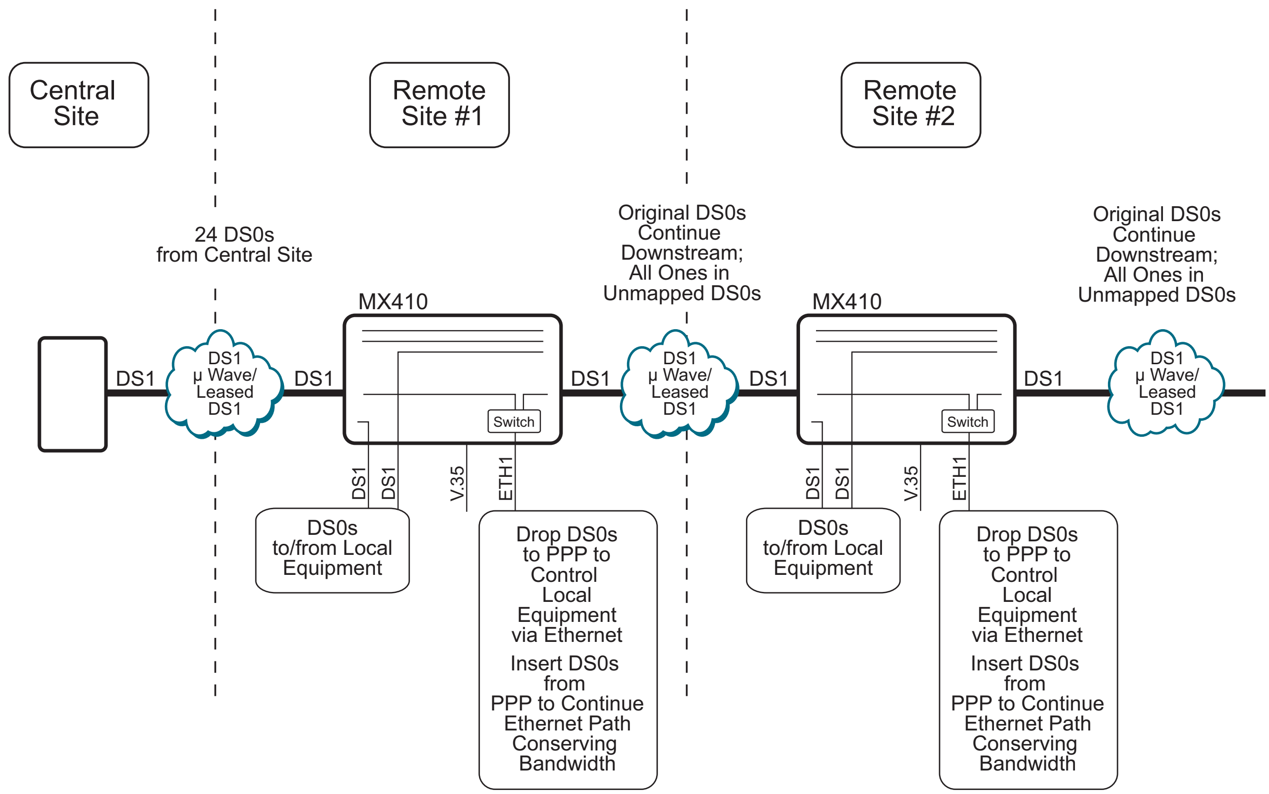


Figure 3-7. Drop and Insert Application Diagram

The equipment needed for a Drop and Insert application is shown in Table 3-2.

Table 3-2. Drop and Insert Application (Required Equipment Per Site)

Part Number	Equipment	Quantity
1189500L1 or 1189512L1	MX410 MX412	1 1
1189501L1	MX410 PSU (MX410 only)	1 (2 for redundancy)

Setup

Connect the DS1 from which the DS0s will be dropped to the DS1 1 RJ. Connect the other DS1 to which the DS0s will be inserted to the DS1 2 RJ. Connect the other DS1s using the other RJ connectors on the front panel. For more information, refer to "DS1 Ports" on page 4-6

Starting from the default mapping the DS0s can be dropped and inserted using the Quick Setup menu (see Figure 5-39 on page 5-52). Select each port (PPP or V.35) to which a DS0 needs to be dropped from the incoming DS1. For each port select the DS0(s) in DS1 1 to be dropped to that port. Then, select each port and DS0 that needs to be inserted into the other DS1. For each DS0 to be inserted, select the DS0 in DS1 2 to insert that DS0. Using the Cross-Connect Mapping menu, select each DS0 that is to be dropped to other DS1 ports as well. Select the Map Multiple DS0s option, then select the range of DS0 and DS1 1 to be dropped to DS1 2 and enable Robbed Bit Signaling if applicable.

For each DS0 dropped out of the incoming DS1 (DS1 1 in this example), that does not have a DS0 dropped or inserted into the corresponding DS0 in the other DS1 (DS1 2 in this example), map the remaining DS0s to continue the data downstream. Any unmapped DS0 will transmit all ones.

The following six figures show an example of setting up a drop and insert application. Figure 3-8 shows the Quick Setup menu before any DS0s have been dropped.

```
                                     MX410                            MM/DD/YY HH:MM
Active Alarms: CRITICAL               MINOR              ID:                   MX410


                                  Quick Setup
 Ports
  1 - PPPs
      PPP 1 = DS1 4 DS0 #1



  2 - V.35  =

 System
  3 - System ID
  4 - IP Address          : 192.168.100.1
      Subnet Mask         : 255.255.0.0
  5 - Default Gateway     : 192.168.1.1
  6 - Date
  7 - Time                               8 - Cross-Connect Mapping


  Selection :                                        '?' - System Help Screen
```

Figure 3-8. Quick Setup Menu

Figure 3-9 shows the Quick Setup menu after DS0s 23-24 have been dropped from DS1 1 to PPP1 and PPP 2 has been inserted into DS0s 23-24 in DS1 2.

```
                                     MX410                            MM/DD/YY HH:MM
Active Alarms: CRITICAL               MINOR             ID:                    MX410


                                  Quick Setup
 Ports
  1 - PPPs
      PPP 1 = DS1 1 DS0 #23-24
      PPP 2 = DS1 2 DS0 #23-24


  2 - V.35  = DS1 1 DS0 #23-24

 System
  3 - System ID
  4 - IP Address          : 192.168.100.1
      Subnet Mask         : 255.255.0.0
  5 - Default Gateway     : 192.168.1.1
  6 - Date
  7 - Time                              8 - Cross-Connect Mapping


  Selection :                                       '?' - System Help Screen
```

Figure 3-9. Drop and Insert Quick Setup - Example

Figure 3-10 shows the Cross-Connect Mapping menu for DS1 1 after mapping the PPPs but prior to mapping the remaining DS0s to be dropped and continued.

```
                                     MX410                            MM/DD/YY HH:MM
Active Alarms: CRITICAL               MINOR             ID:                    MX410


                             Cross-Connect Mapping
      DS1 1

  1 - DS0 #1  = DS1 2 DS0 #1              13 - DS0 #13 = DS1 2 DS0 #13
  2 - DS0 #2  = DS1 2 DS0 #2              14 - DS0 #14 = DS1 2 DS0 #14
  3 - DS0 #3  = DS1 2 DS0 #3              15 - DS0 #15 = DS1 2 DS0 #15
  4 - DS0 #4  = DS1 2 DS0 #4              16 - DS0 #16 = DS1 2 DS0 #16
  5 - DS0 #5  = DS1 2 DS0 #5              17 - DS0 #17 = DS1 2 DS0 #17
  6 - DS0 #6  = DS1 2 DS0 #6              18 - DS0 #18 = DS1 2 DS0 #18
  7 - DS0 #7  = DS1 2 DS0 #7              19 - DS0 #19 = DS1 2 DS0 #19
  8 - DS0 #8  = DS1 2 DS0 #8              20 - DS0 #20 = DS1 2 DS0 #20
  9 - DS0 #9  = DS1 2 DS0 #9              21 - DS0 #21 = DS1 2 DS0 #21
 10 - DS0 #10 = DS1 2 DS0 #10             22 - DS0 #22 = DS1 2 DS0 #22
 11 - DS0 #11 = DS1 2 DS0 #11             23 - DS0 #23 = PPP 1
 12 - DS0 #12 = DS1 2 DS0 #12             24 - DS0 #24 = PPP 1

  (T)oggle View (DS1 2, DS1 3, DS1 4, Ports)      25 - Map Multiple DS0's

  Selection :                                       '?' - System Help Screen
```

Figure 3-10. Drop and Insert Cross-Connect Mapping - Example 1

Figure 3-11 shows the Cross-Connect Mapping menu after DS0s 1-12 are continued through from DS1 1 to DS1 2 and DS0s 13-22 are dropped from DS1 1 to DS1 3.

```
                                    MX410                            MM/DD/YY HH:MM
Active Alarms: CRITICAL              MINOR             ID:                   MX410


                             Cross-Connect Mapping
       DS1 1

  1 - DS0 #1  = DS1 2 DS0 #1             13 - DS0 #13 = DS1 3 DS0 #1
  2 - DS0 #2  = DS1 2 DS0 #2             14 - DS0 #14 = DS1 3 DS0 #2
  3 - DS0 #3  = DS1 2 DS0 #3             15 - DS0 #15 = DS1 3 DS0 #3
  4 - DS0 #4  = DS1 2 DS0 #4             16 - DS0 #16 = DS1 3 DS0 #4
  5 - DS0 #5  = DS1 2 DS0 #5             17 - DS0 #17 = DS1 3 DS0 #5
  6 - DS0 #6  = DS1 2 DS0 #6             18 - DS0 #18 = DS1 3 DS0 #6
  7 - DS0 #7  = DS1 2 DS0 #7             19 - DS0 #19 = DS1 3 DS0 #7
  8 - DS0 #8  = DS1 2 DS0 #8             20 - DS0 #20 = DS1 3 DS0 #8
  9 - DS0 #9  = DS1 2 DS0 #9             21 - DS0 #21 = DS1 3 DS0 #9
 10 - DS0 #10 = DS1 2 DS0 #10            22 - DS0 #22 = DS1 3 DS0 #10
 11 - DS0 #11 = DS1 2 DS0 #11            23 - DS0 #23 = PPP 1
 12 - DS0 #12 = DS1 2 DS0 #12            24 - DS0 #24 = PPP 1

  (T)oggle View (DS1 2, DS1 3, DS1 4, Ports)      25 - Map Multiple DS0's

  Selection :                                         '?' - System Help Screen
```

Figure 3-11. Drop and Insert Cross-Connect Mapping - Example 2

Figure 3-12 shows the Cross-Connect Mapping menu for DS1 2 after all ports are dropped and continued from DS1 1.

```
                                    MX410                            MM/DD/YY HH:MM
Active Alarms: CRITICAL              MINOR             ID:                   MX410


                             Cross-Connect Mapping
       DS1 2

  1 - DS0 #1  = DS1 1 DS0 #1             13 - DS0 #13 =
  2 - DS0 #2  = DS1 1 DS0 #2             14 - DS0 #14 =
  3 - DS0 #3  = DS1 1 DS0 #3             15 - DS0 #15 =
  4 - DS0 #4  = DS1 1 DS0 #4             16 - DS0 #16 =
  5 - DS0 #5  = DS1 1 DS0 #5             17 - DS0 #17 =
  6 - DS0 #6  = DS1 1 DS0 #6             18 - DS0 #18 =
  7 - DS0 #7  = DS1 1 DS0 #7             19 - DS0 #19 =
  8 - DS0 #8  = DS1 1 DS0 #8             20 - DS0 #20 =
  9 - DS0 #9  = DS1 1 DS0 #9             21 - DS0 #21 =
 10 - DS0 #10 = DS1 1 DS0 #10            22 - DS0 #22 =
 11 - DS0 #11 = DS1 1 DS0 #11            23 - DS0 #23 = PPP 2
 12 - DS0 #12 = DS1 1 DS0 #12            24 - DS0 #24 = PPP 2

  (T)oggle View (DS1 3, DS1 4, Ports, DS1 1)      25 - Map Multiple DS0's

  Selection :                                         '?' - System Help Screen
```

Figure 3-12. Drop and Insert Cross-Connect Mapping - Example 3

Figure 3-13 shows the Cross-Connect Mapping menu after DS0s 13-22 are inserted in DS1 2 from DS1 4. Any unmapped DS0s will be filled with all ones.

```
                              MX410                          MM/DD/YY HH:MM
Active Alarms: CRITICAL        MINOR            ID:                   MX410


                           Cross-Connect Mapping
      DS1 2

  1 - DS0 #1  = DS1 1 DS0 #1            13 - DS0 #13 = DS1 4 DS0 #1
  2 - DS0 #2  = DS1 1 DS0 #2            14 - DS0 #14 = DS1 4 DS0 #2
  3 - DS0 #3  = DS1 1 DS0 #3            15 - DS0 #15 = DS1 4 DS0 #3
  4 - DS0 #4  = DS1 1 DS0 #4            16 - DS0 #16 = DS1 4 DS0 #4
  5 - DS0 #5  = DS1 1 DS0 #5            17 - DS0 #17 = DS1 4 DS0 #5
  6 - DS0 #6  = DS1 1 DS0 #6            18 - DS0 #18 = DS1 4 DS0 #6
  7 - DS0 #7  = DS1 1 DS0 #7            19 - DS0 #19 = DS1 4 DS0 #7
  8 - DS0 #8  = DS1 1 DS0 #8            20 - DS0 #20 = DS1 4 DS0 #8
  9 - DS0 #9  = DS1 1 DS0 #9            21 - DS0 #21 = DS1 4 DS0 #9
 10 - DS0 #10 = DS1 1 DS0 #10           22 - DS0 #22 = DS1 4 DS0 #10
 11 - DS0 #11 = DS1 1 DS0 #11           23 - DS0 #23 = PPP 2
 12 - DS0 #12 = DS1 1 DS0 #12           24 - DS0 #24 = PPP 2

  (T)oggle View (DS1 3, DS1 4, Ports, DS1 1)      25 - Map Multiple DS0's

  Selection :                                        '?' - System Help Screen
```

Figure 3-13. Drop and Insert Cross-Connect Mapping - Example 4

Integrated Wireless Access Device or DS0 Grooming

The following applies to Remote Site #1 shown in Figure 3-14 and Figure 3-15. In the Integrated Wireless Access Device Application, bandwidth is conserved by using the MX410 to groom multiple fractional T1s into a single T1. This allows the MX410 to be used as an integrated wireless access device (see Figure 3-14) or to transport DS0s between several sites (see Figure 3-15).

Refer to "PPP BCP/IPCP Menu" on page 5-38 for more information about using PPP.

Refer to "Alarm Pass Thru" on page 5-23 for information about visibility through the cross connect.

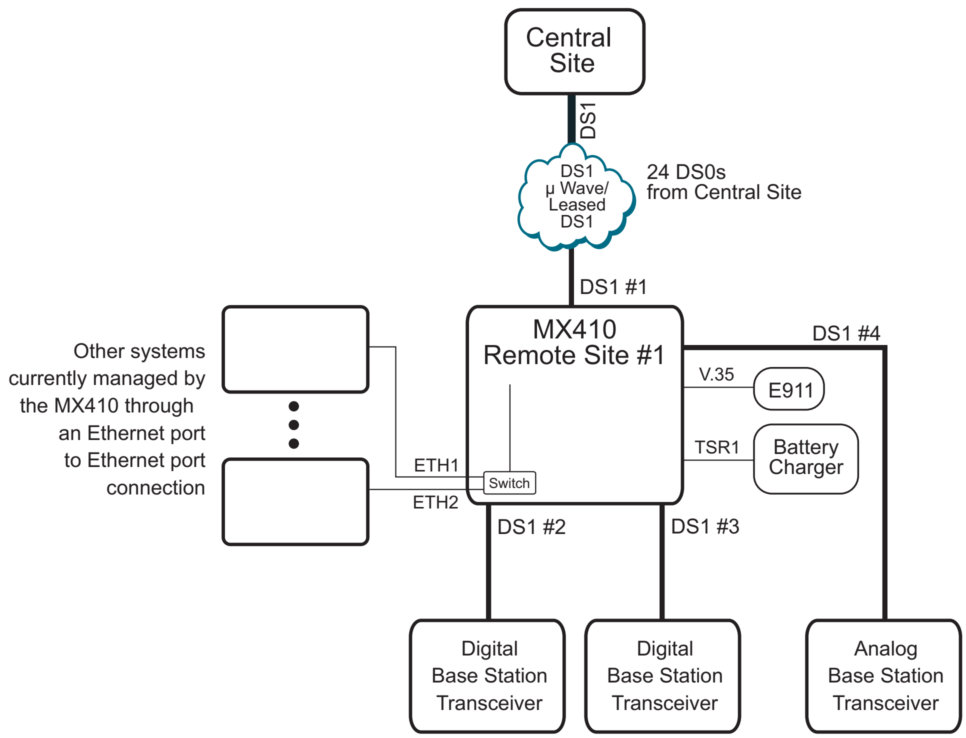


Figure 3-14. Integrated Wireless Access Device Diagram

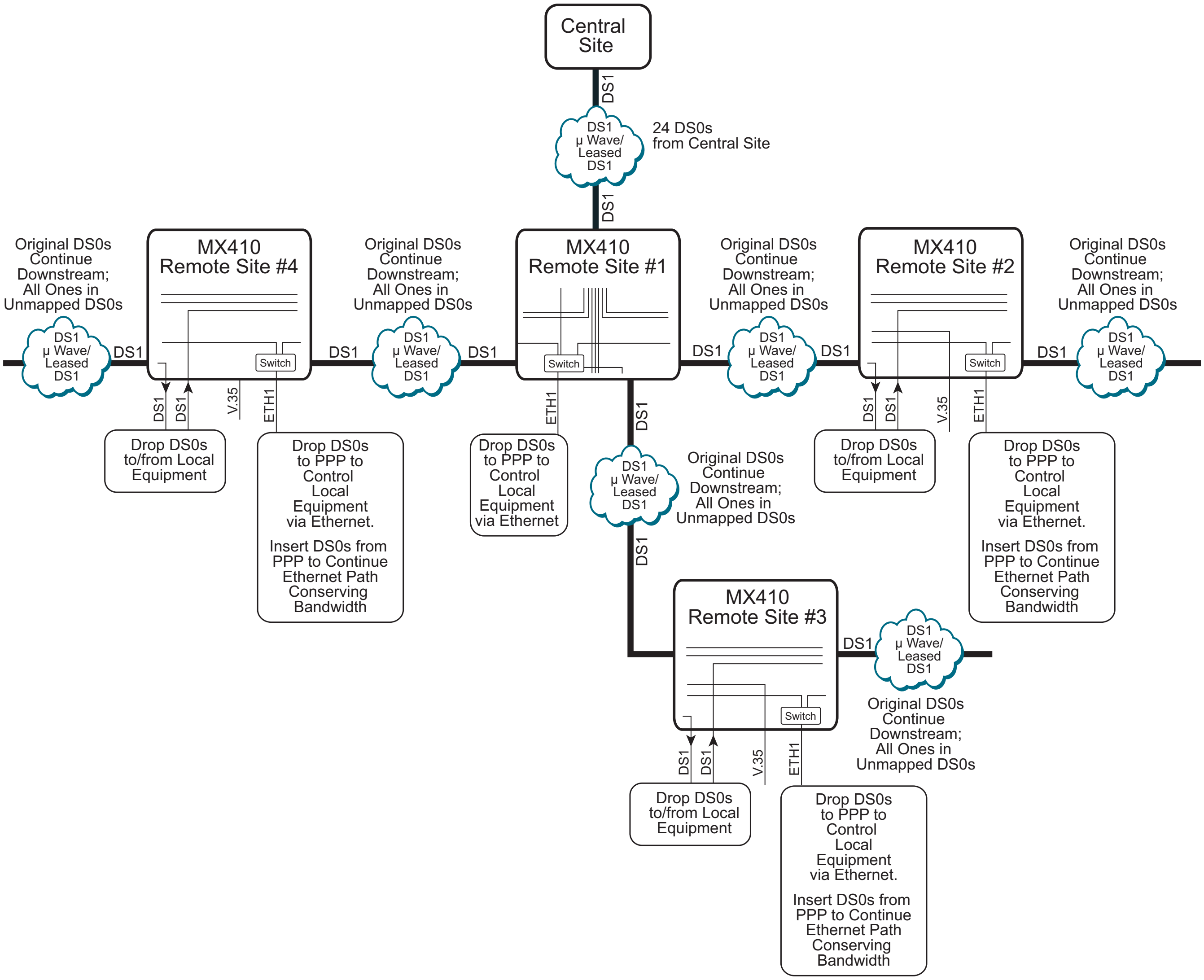


Figure 3-15. Bandwidth Efficiency with DS0 Grooming Diagram

The equipment needed for an Integrated Wireless Access Device or Bandwidth Efficiency with DS0 Grooming application is shown in Table 3-3.

Table 3-3. Integrated Wireless Access Device Application (Required Equipment Per Site)

Part Number	Equipment	Quantity
1189500L1 or 1189512L1	MX410 MX412	1 1
1189501L1	MX410 PSU (MX410 only)	1 (2 for redundancy)

Setup

Connect the DS1 from which the DS0s will be dropped to the DS1 1 RJ Connector. Connect the other DS1s to DS1, 2, 3, and 4 RJ Connectors. For more information, refer to "DS1 Ports" on page 4-6.

Starting from the default mapping the DS0s can be mapped using the Quick Setup menu shown in Figure 3-16. Select each port to which a DS0 needs to be dropped from the incoming DS1. For each port select the DS0(s) in DS1 1 to be dropped to that port. Using the Cross-Connect Mapping menu, select each DS0 that is to be mapped from other DS1 ports as well. If robbed bit signaling is needed, select the Map Multiple DS0's option and then select the range of DS0 and DS1 1 to be dropped to DS1 2 and enable Robbed Bit Signaling.

For an integrated wireless access device application, map DS0s to the corresponding DS0 in the other DS1 (DS1, 2, 3, and 4 in this example). For a grooming application, each DS0 dropped out of the incoming DS1 (DS1 1 in this example), that does not have a DS0 dropped or inserted into the corresponding DS0 in the other DS1 (DS1 2, 3, and 4 in this example), map the groomed DS0s to continue the data downstream. Any unmapped DS0 will transmit all ones.

The following six figures show an example of setting up an integrated wireless access device or grooming application. Figure 3-16 shows the Quick Setup menu before any DS0s have been dropped.

```
                                      MX410                        MM/DD/YY HH:MM
Active Alarms: CRITICAL                MINOR              ID:               MX410


                                   Quick Setup
 Ports
  1 - PPPs




  2 - V.35  =

 System
  3 - System ID
  4 - IP Address          : 192.168.100.1
      Subnet Mask         : 255.255.0.0
  5 - Default Gateway     : 192.168.1.1
  6 - Date
  7 - Time                               8 - Cross-Connect Mapping


  Selection :                                        '?' - System Help Screen
```

Figure 3-16. Quick Setup Menu

Figure 3-17 shows the Quick Setup menu after DS0s 23-24 have been dropped from DS1 1 to PPP1, and PPP 2, 3, and 4 have been inserted into DS0s 23-24 in DS1 2, 3, and 4, respectively. PPP 2, 3, and 4 are typically not used in this fashion for the integrated wireless access device application.

```
                                      MX410                            MM/DD/YY HH:MM
Active Alarms: CRITICAL                MINOR              ID:                   MX410


                                   Quick Setup
 Ports
  1 - PPPs
      PPP 1 = DS1 1 DS0 #23-24
      PPP 2 = DS1 2 DS0 #23-24
      PPP 3 = DS1 3 DS0 #23-24
      PPP 4 = DS1 4 DS0 #23-24
  2 - V.35  =

 System
  3 - System ID
  4 - IP Address          : 192.168.100.1
      Subnet Mask         : 255.255.0.0
  5 - Default Gateway     : 192.168.1.1
  6 - Date
  7 - Time                                8 - Cross-Connect Mapping


  Selection :                                         '?' - System Help Screen
```

Figure 3-17. Integrated Wireless Access Device Quick Setup - Example

Figure 3-18 shows the Cross-Connect Mapping menu for DS1 1 after mapping the PPPs but prior to mapping the remaining DS0s to be mapped.

```
                                      MX410                            MM/DD/YY HH:MM
Active Alarms: CRITICAL                MINOR              ID:                   MX410


                              Cross-Connect Mapping
      DS1 1

  1 - DS0 #1  = DS1 2 DS0 #1               13 - DS0 #13 = DS1 2 DS0 #13
  2 - DS0 #2  = DS1 2 DS0 #2               14 - DS0 #14 = DS1 2 DS0 #14
  3 - DS0 #3  = DS1 2 DS0 #3               15 - DS0 #15 = DS1 2 DS0 #15
  4 - DS0 #4  = DS1 2 DS0 #4               16 - DS0 #16 = DS1 2 DS0 #16
  5 - DS0 #5  = DS1 2 DS0 #5               17 - DS0 #17 = DS1 2 DS0 #17
  6 - DS0 #6  = DS1 2 DS0 #6               18 - DS0 #18 = DS1 2 DS0 #18
  7 - DS0 #7  = DS1 2 DS0 #7               19 - DS0 #19 = DS1 2 DS0 #19
  8 - DS0 #8  = DS1 2 DS0 #8               20 - DS0 #20 = DS1 2 DS0 #20
  9 - DS0 #9  = DS1 2 DS0 #9               21 - DS0 #21 = DS1 2 DS0 #21
 10 - DS0 #10 = DS1 2 DS0 #10              22 - DS0 #22 = DS1 2 DS0 #22
 11 - DS0 #11 = DS1 2 DS0 #11              23 - DS0 #23 = PPP 1
 12 - DS0 #12 = DS1 2 DS0 #12              24 - DS0 #24 = PPP 1

  (T)oggle View (DS1 2, DS1 3, DS1 4, Ports)      25 - Map Multiple DS0's

  Selection :                                         '?' - System Help Screen
```

Figure 3-18. Integrated Wireless Access Device Cross-Connect Map - Example 1

Figure 3-19 shows the Cross-Connect Mapping menu after DS0s 1-7 are mapped from DS1 1 to DS1 2, DS0s 8-14 are mapped from DS1 1 to DS1 3, and DS0s 15-22 are mapped from DS1 1 to DS1 4.

```
                                      MX410                             MM/DD/YY HH:MM
Active Alarms: CRITICAL                MINOR             ID:                     MX410


                              Cross-Connect Mapping
       DS1 1

  1 - DS0 #1  = DS1 2 DS0 #1            13 - DS0 #13 = DS1 3 DS0 #6
  2 - DS0 #2  = DS1 2 DS0 #2            14 - DS0 #14 = DS1 3 DS0 #7
  3 - DS0 #3  = DS1 2 DS0 #3            15 - DS0 #15 = DS1 4 DS0 #1
  4 - DS0 #4  = DS1 2 DS0 #4            16 - DS0 #16 = DS1 4 DS0 #2
  5 - DS0 #5  = DS1 2 DS0 #5            17 - DS0 #17 = DS1 4 DS0 #3
  6 - DS0 #6  = DS1 2 DS0 #6            18 - DS0 #18 = DS1 4 DS0 #4
  7 - DS0 #7  = DS1 2 DS0 #7            19 - DS0 #19 = DS1 4 DS0 #5
  8 - DS0 #8  = DS1 3 DS0 #1            20 - DS0 #20 = DS1 4 DS0 #6
  9 - DS0 #9  = DS1 3 DS0 #2            21 - DS0 #21 = DS1 4 DS0 #7
 10 - DS0 #10 = DS1 3 DS0 #3            22 - DS0 #22 = DS1 2 DS0 #22
 11 - DS0 #11 = DS1 3 DS0 #4            23 - DS0 #23 = PPP 1
 12 - DS0 #12 = DS1 3 DS0 #5            24 - DS0 #24 = PPP 1

  (T)oggle View (DS1 2, DS1 3, DS1 4, Ports)      25 - Map Multiple DS0's

  Selection :                                         '?' - System Help Screen
```

Figure 3-19. Integrated Wireless Access Device Cross-Connect Map - Example 2

Figure 3-20 shows the Cross-Connect Mapping menu for DS1 2 after all ports are mapped from DS1 1.

```
                                      MX410                             MM/DD/YY HH:MM
Active Alarms: CRITICAL                MINOR             ID:                     MX410


                              Cross-Connect Mapping
       DS1 2

  1 - DS0 #1  = DS1 1 DS0 #1            13 - DS0 #13 =
  2 - DS0 #2  = DS1 1 DS0 #2            14 - DS0 #14 =
  3 - DS0 #3  = DS1 1 DS0 #3            15 - DS0 #15 =
  4 - DS0 #4  = DS1 1 DS0 #4            16 - DS0 #16 =
  5 - DS0 #5  = DS1 1 DS0 #5            17 - DS0 #17 =
  6 - DS0 #6  = DS1 1 DS0 #6            18 - DS0 #18 =
  7 - DS0 #7  = DS1 1 DS0 #7            19 - DS0 #19 =
  8 - DS0 #8  =                         20 - DS0 #20 =
  9 - DS0 #9  =                         21 - DS0 #21 =
 10 - DS0 #10 =                         22 - DS0 #22 = DS1 1 DS0 #22
 11 - DS0 #11 =                         23 - DS0 #23 = PPP 2
 12 - DS0 #12 =                         24 - DS0 #24 = PPP 2

  (T)oggle View (DS1 3, DS1 4, Ports, DS1 1)      25 - Map Multiple DS0's

  Selection :                                         '?' - System Help Screen
```

Figure 3-20. Integrated Wireless Access Device Cross-Connect Map - Example 3

Figure 3-21 shows the Cross-Connect Mapping menu for DS1 3.

```
                                      MX410                            MM/DD/YY HH:MM
Active Alarms: CRITICAL                MINOR              ID:                   MX410


                             Cross-Connect Mapping
       DS1 3

  1 - DS0 #1  = DS1 1 DS0 #8            13 - DS0 #13 = DS1 4 DS0 #13
  2 - DS0 #2  = DS1 1 DS0 #9            14 - DS0 #14 = DS1 4 DS0 #14
  3 - DS0 #3  = DS1 1 DS0 #10           15 - DS0 #15 = DS1 4 DS0 #15
  4 - DS0 #4  = DS1 1 DS0 #11           16 - DS0 #16 = DS1 4 DS0 #16
  5 - DS0 #5  = DS1 1 DS0 #12           17 - DS0 #17 = DS1 4 DS0 #17
  6 - DS0 #6  = DS1 1 DS0 #13           18 - DS0 #18 = DS1 4 DS0 #18
  7 - DS0 #7  = DS1 1 DS0 #14           19 - DS0 #19 = DS1 4 DS0 #19
  8 - DS0 #8  = DS1 4 DS0 #8            20 - DS0 #20 = DS1 4 DS0 #20
  9 - DS0 #9  = DS1 4 DS0 #9            21 - DS0 #21 = DS1 4 DS0 #21
 10 - DS0 #10 = DS1 4 DS0 #10           22 - DS0 #22 = DS1 4 DS0 #22
 11 - DS0 #11 = DS1 4 DS0 #11           23 - DS0 #23 = PPP 3
 12 - DS0 #12 = DS1 4 DS0 #12           24 - DS0 #24 = PPP 3

  (T)oggle View (DS1 4, Ports, DS1 1, DS1 2)      25 - Map Multiple DS0's

  Selection :                                         '?' - System Help Screen
```

Figure 3-21. Integrated Wireless Access Device Cross-Connect Map - Example 4

Figure 3-22 shows the Cross-Connect Mapping menu for DS1 4. Any unmapped DS0s are filled with all ones.

```
                                      MX410                            MM/DD/YY HH:MM
Active Alarms: CRITICAL                MINOR              ID:                   MX410


                             Cross-Connect Mapping
       DS1 4

  1 - DS0 #1  = DS1 1 DS0 #15           13 - DS0 #13 = DS1 3 DS0 #13
  2 - DS0 #2  = DS1 1 DS0 #16           14 - DS0 #14 = DS1 3 DS0 #14
  3 - DS0 #3  = DS1 1 DS0 #17           15 - DS0 #15 = DS1 3 DS0 #15
  4 - DS0 #4  = DS1 1 DS0 #18           16 - DS0 #16 = DS1 3 DS0 #16
  5 - DS0 #5  = DS1 1 DS0 #19           17 - DS0 #17 = DS1 3 DS0 #17
  6 - DS0 #6  = DS1 1 DS0 #20           18 - DS0 #18 = DS1 3 DS0 #18
  7 - DS0 #7  = DS1 1 DS0 #21           19 - DS0 #19 = DS1 3 DS0 #19
  8 - DS0 #8  = DS1 3 DS0 #8            20 - DS0 #20 = DS1 3 DS0 #20
  9 - DS0 #9  = DS1 3 DS0 #9            21 - DS0 #21 = DS1 3 DS0 #21
 10 - DS0 #10 = DS1 3 DS0 #10           22 - DS0 #22 = DS1 3 DS0 #22
 11 - DS0 #11 = DS1 3 DS0 #11           23 - DS0 #23 = PPP 4
 12 - DS0 #12 = DS1 3 DS0 #12           24 - DS0 #24 = PPP 4

  (T)oggle View (Ports, DS1 1, DS1 2, DS1 3)      25 - Map Multiple DS0's

  Selection :                                         '?' - System Help Screen
```

Figure 3-22. Integrated Wireless Access Device Cross-Connect Map - Example 5

Remote Management of Other Systems using Terminal Server Ports and Ethernet Connectivity

In this application, the Terminal Server ports on the MX410 are used to provide remote management of other non-Ethernet based equipment at the same site. This requires connecting the RS-232 craft ports of the other equipment to the Terminal Server ports of the MX410. Establishing a Telnet session to the MX410 Terminal Server ports establishes access to the other equipment. Up to four external devices can be accessed in this way.

The Ethernet ports on the MX410 are used to provide remote management of the other Ethernet based equipment. This requires connecting the Ethernet ports of the other equipment to the Ethernet ports on the MX410 (see Figure 3-23). Refer to "PPP BCP/IPCP Menu" on page 5-38 for more information about PPP and IP.

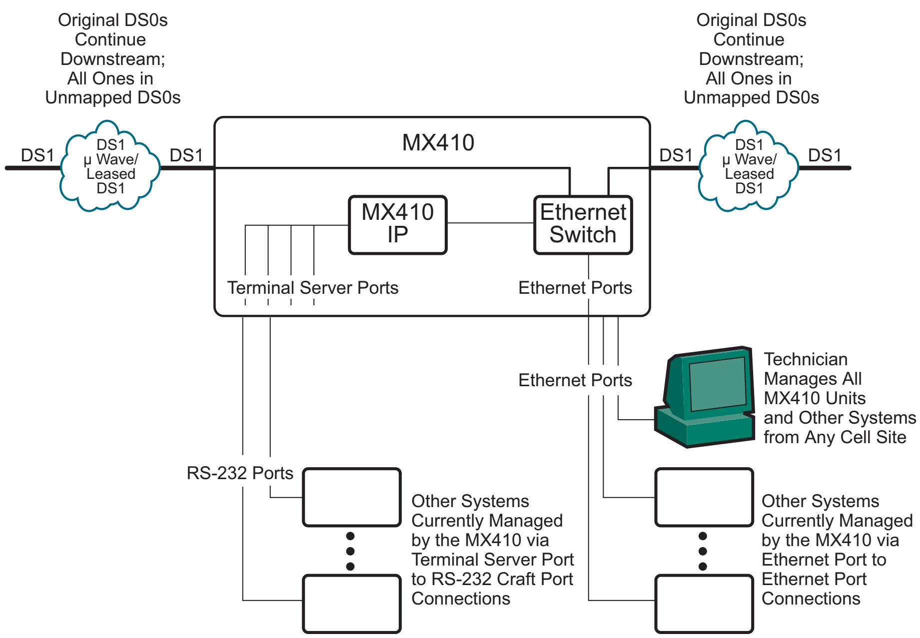


Figure 3-23. MX410 Remote Management of Other Systems

The equipment needed for a Remote Management application is shown in Table 3-4.

Table 3-4. Remote Management Application (Required Equipment Per Site)

Part Number	Equipment	Quantity
1189500L1 or 1189512L1	MX410 MX412	1 1
1189501L1	MX410 PSU (MX410 only)	1 (2 for redundancy)

Setup

First, connect the RS-232 craft port on the other equipment to the MX410 terminal server port. For more information, refer to “Terminal Server Ports” on page 4-8.

The default settings for the terminal server ports are 9600 bps and 8 data bits with no parity (see Figure 3-24). These settings must match the craft port settings of the other equipment for the application to work. Baud Rate can be changed in the MX410 Terminal Server menus under Provisioning.

```
                                     MX410                            MM/DD/YY HH:MM
Active Alarms: CRITICAL                                         ID:            MX410


                            Terminal Server Port 1

                        1 - Terminal State           : Enabled
                        2 - Baud Rate                : 9600
                        3 - Telnet Port Number       : 2023
                        4 - Security                 : Enabled
                        5 - Username                 : port 1
                        6 - Password                 : password


  Selection :                                                 '?' - System Help Screen
```

Figure 3-24. Terminal Server Port Menu

Then, establish a Telnet session to the MX410 with the port number for the particular port to access the other equipment. The default IP address for the MX410 is 192.168.100.1 with a subnet mask of 255.255.0.0. The port numbers default to 2023, 2024, 2025, and 2026, respectively, for each of the four ports. Once the session is established, the default username for each port is “port #” (where # is the number of the port) and the default password is “password”.

For Ethernet based devices, simply assign a static IP address to the other equipment (or enable the DHCP server to provide one) and connect its Ethernet port to one of the four switch ports (Ethernet 1 - 4) on the front panel for the MX410. Refer to “DHCP Server Menu” on page 5-40 for more information about DHCP servers.

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Section 4
Installation

GENERAL

The first three tasks for installing and operating the MX410/MX412 are to unpack, inspect, and install. Those tasks are detailed in this section of the manual, as well as information for mounting the MX410/MX412 into an equipment rack or to a wall, making the proper connections to the front and rear panels, identifying the front panel indicators, and adding or removing a Power Supply Unit (PSU).

NOTE

The PSU (P/N 1189501L1) is only available for the MX410. The MX412 contains an internal power supply.

RECEIVING INSPECTION

Inspect the MX410/MX412 for any damage that might have occurred in shipment. If damage is suspected, file a claim immediately with the carrier, keep the original packaging for damage verification and/or returning the unit, and contact ADTRAN Customer Service. For warranty information, refer to "Appendix A, Warranty".

ADTRAN SHIPPING CONTENTS

After unpacking the MX410 or MX412, verify that the following items are present:

- MX410 and MX410 PSU

  or

  MX412
- Installation Hardware
  - Blank PSU cover (P/N 1189502L1) - MX410 only
  - Ground lug with nut and lock washer
  - Wire-wrap post cover and screw
  - Power connector
  - Mounting brackets and screws for 19-inch rack or wall installation
  - 23-inch mounting bracket adapter

RACKMOUNT

For a rackmount installation, perform the following steps:

1. Ensure the mounting brackets to the MX410/MX412 are attached using the two screws provided for each bracket.
    - For 19-inch rack applications, attach the brackets with the short flange parallel with the front of the chassis (see Figure 4-1).
    - For 23-inch rack applications, attach the brackets with the short flange parallel with the front of the chassis and obtain 23-inch adapter mounting hardware.
2. Connect the frame ground from the frame ground lug on the upper right rear panel of the MX410/MX412 to the equipment rack grounding screw or other appropriate grounding connection before mounting.
3. Use the appropriate rack type screws to mount the MX410/MX412 into the rack.

CAUTION

Care should be taken to not upset the stability of the equipment rack after installation is complete.

NOTE

The unit must be installed in accordance with the requirements of NEC NFPA 70. When mounting the MX410/MX412 in a rack, multiple chassis can be mounted in adjacent rack slots.

WALLMOUNT

For a wallmount installation, perform the following steps:

1. Ensure the mounting brackets to the MX410/MX412 are attached using the two screws provided for each bracket. Attach the brackets with the short flange parallel with the bottom of the MX410/MX412 chassis (see Figure 4-1).
2. Connect the frame ground from the frame ground lug on the upper right rear panel of the MX410/MX412 to an appropriate grounding connection.
3. Mount the MX410/MX412 vertically with the front panel facing to the left or right side.

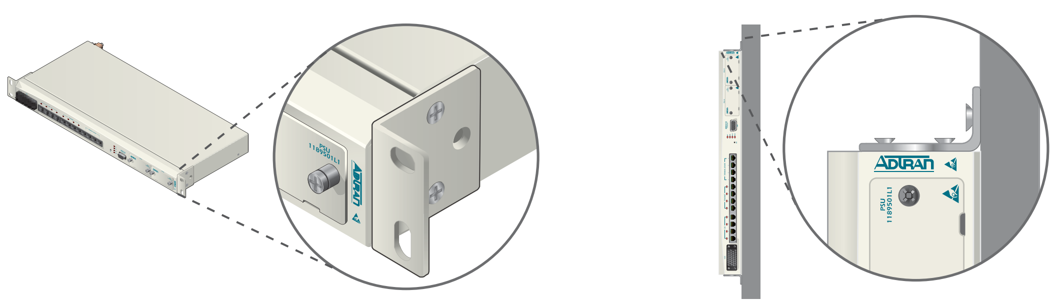


Figure 4-1. Rackmount and Wallmount Orientation

REAR PANEL

The MX410/MX412 rear panel is equipped with wire-wrap pins for external auxiliary inputs, wire-wrap pins for alarms (critical, major, and minor), a frame ground lug, and a single power connector for both DC power feeds (A and B). Figure 4-2 illustrates the rear panel.

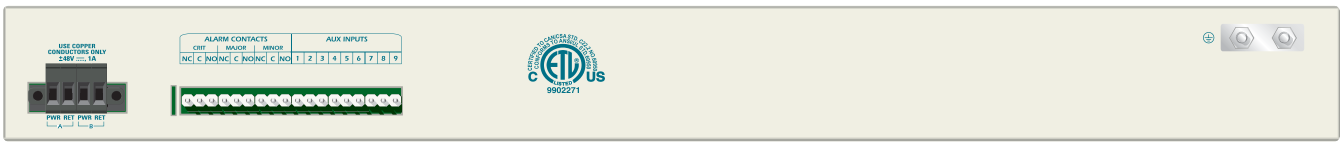


Figure 4-2. MX410/MX412 Rear Panel

WARNING

The alarm interfaces and AUX inputs **must not** be metallically connected to interfaces which connect to the Outside Plant or its wiring. These interfaces are designed for use as intra-building interfaces only. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring.

Power Connection

Figure 4-3 illustrates the DC power pins and power connector. For more information, refer to "Power Up" on page 4-11.

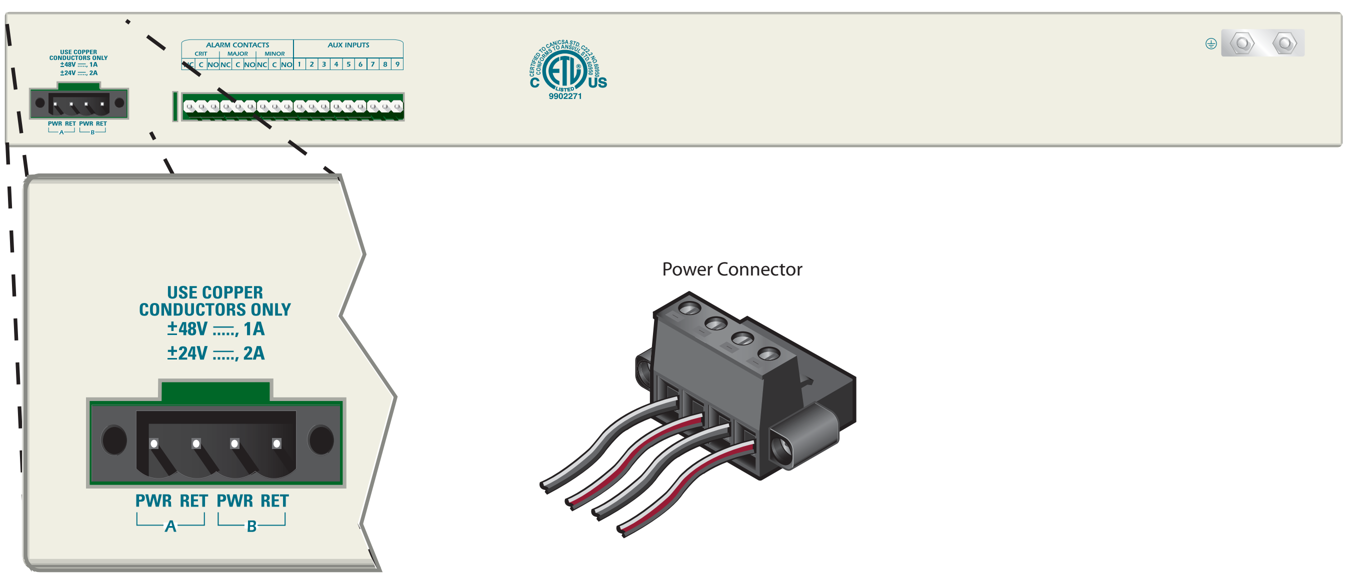


Figure 4-3. DC Power Connections

Alarm Contacts/Auxiliary Inputs

The alarm contacts and auxiliary (AUX) inputs are shown in Figure 4-4.

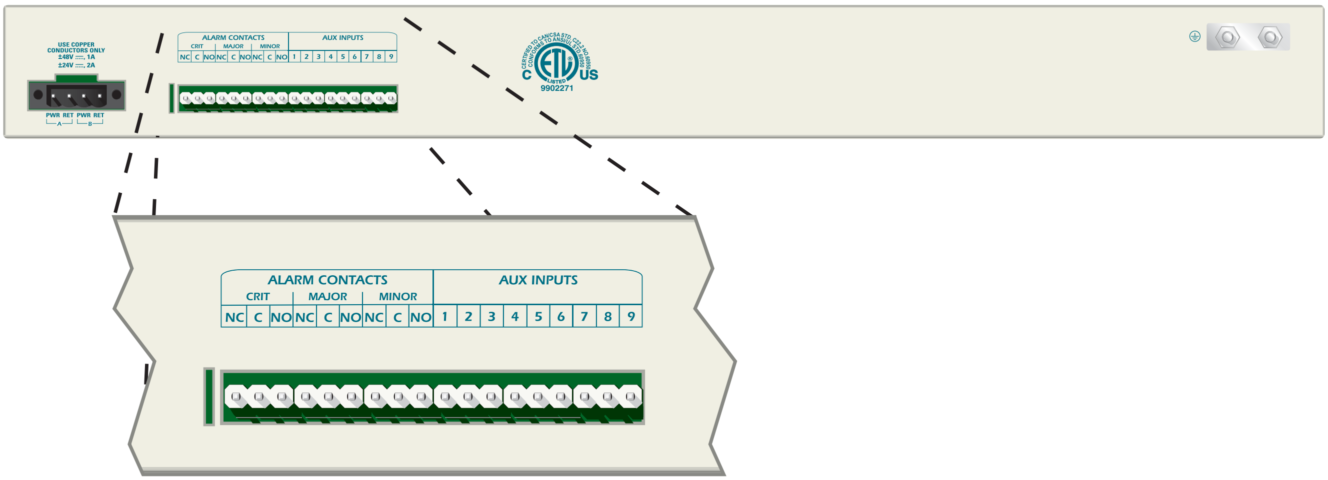


Figure 4-4. Alarm Contacts and AUX Inputs

The alarm interfaces connect to the nine Form C type relays on the MX410/MX412 labeled **CRIT** (Critical), **MAJOR**, and **MINOR**. Both NC (Normally Closed) and NO (Normally Open) contacts are provided. Connect the **CRIT**, **MAJOR**, and **MINOR** alarm leads from the fuse and alarm panel to the **C** (Common) and **NO** or **NC** wire-wrap terminals on the MX410/MX412 rear panel as required.

Auxiliary alarms 1-4 connect to the MX410/MX412 AUX inputs, which are labeled **AUX INPUTS 1-9**. These pins detect open and closed relay contacts and are not polarity sensitive. Table 4-1 shows the pin assignments for the AUX inputs.

Table 4-1. AUX Inputs 1-9 Pin List

AUX INPUT	Function	Default Severity Level
1, 2	Alarm 1	Critical
3, 4	Alarm 2	Major
5, 6	Alarm 3	Minor
7, 8	Alarm 4	Alert
9	No Connect	N/A

The alarm severity level can be changed in the Environmental Alarms menu.

After the alarm contact and AUX input connections have been made, install the protective cover over the wire-wrap headers.

FRONT PANEL

The front panels for the MX410 and MX412 are described below.

MX410

The MX410 front panel (see Figure 4-5) is equipped with the following:

- One V.35 Port (refer to "V.35 Port" on page 4-6)
- Four DS1 ports (refer to "DS1 Ports" on page 4-6)
- Four Ethernet ports (refer to "Ethernet Ports" on page 4-7)
- Four Terminal Server ports (refer to "Terminal Server Ports" on page 4-8)
- One ACO switch (refer to "Alarm Cutoff Switch" on page 4-8)
- One Craft port (refer to "Craft Port" on page 4-8)
- Two PSU slots (refer to "PSU Slots (MX410 Only)" on page 4-9)
- LED indicators (refer to "LED Indicators" on page 4-10)

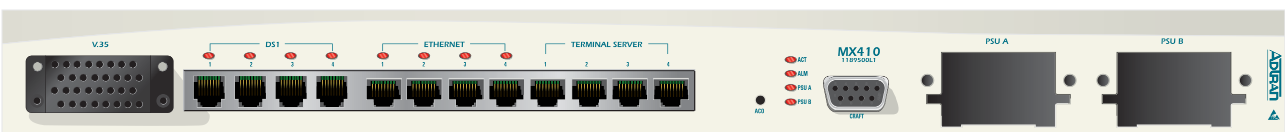


Figure 4-5. MX410 Front Panel

MX412

The MX412 front panel (see Figure 4-6) is equipped with the following:

- One V.35 Port (refer to "V.35 Port" on page 4-6)
- Twelve DS1 ports (refer to "DS1 Ports" on page 4-6)
- Four Ethernet ports (refer to "Ethernet Ports" on page 4-7)
- Four Terminal Server ports (refer to "Terminal Server Ports" on page 4-8)
- One ACO switch (refer to "Alarm Cutoff Switch" on page 4-8)
- One Craft port (refer to "Craft Port" on page 4-8)
- One FXS port (refer to "FXS Port" on page 4-9)
- LED indicators (refer to "LED Indicators" on page 4-10)

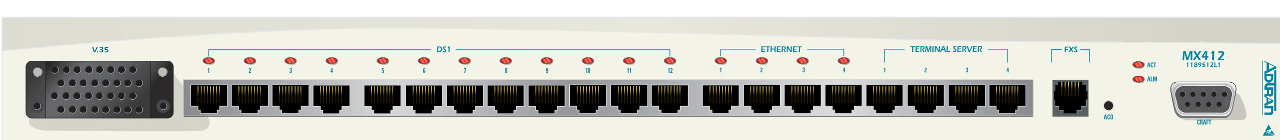


Figure 4-6. MX412 Front Panel

V.35 Port

The V.35 port is a Nx64k serial interface (up to 1.536 Mbps) with a CCITT V.35, 34-pin connector. The pin assignments for the V.35 connector are listed in Table 4-2.

Table 4-2. V.35 Connector Pin Assignments

Pin	Function	Pin	Function
A	Digital Ground	R	Receive Data to DTE - A1
B	Digital Ground	S	Transmit Data from DTE - B1
C	Request To Send (RTS)	T	Receive Data to DTE - B1
D	Clear To Send (CTS)	U	No Connect
E	Data Set Ready (DSR)	V	Receive Clock to DTE - A1
F	Data Carrier Detect (DCD)	W	No Connect
H	Data Terminal Ready (DTR)	X	Receive Clock to DTE - B1
J	Ring	Y	Transmit Clock to DTE - A1
K	No Connect	AA	Transmit Clock to DTE - B1
L	No Connect	BB	No Connect
N	No Connect	NN	No Connect
P	Transmit Data from Data Terminal Equipment (DTE) - A1		

DS1 Ports

The DS1 interfaces located on the front panel of the MX410/MX412 are RJ-48 connectors. The pin assignments for the RJ-48 connector are listed in Table 4-3.

Table 4-3. RJ-48 Connector Pin Assignments

Pin	Function
1	RX Ring
2	RX Tip
3	No Connect
4	TX Ring
5	TX Tip
6	No Connect
7	No Connect
8	No Connect

Ethernet Ports

The four Ethernet jacks, labeled **ETHERNET**, are located on the MX410/MX412 front panel. They provide LAN access to the network. From these ports, devices located on the local area network can be remotely managed. The Ethernet ports have automatic rate detection and perform MDI/MDI-X crossover detection eliminating the need for a crossover cable. The Ethernet ports can be accessed using a standard CAT 5 cable with an RJ-45 connector. The pin assignments for the RJ-45 connector are listed in Table 4-4.

WARNING

The Ethernet and Terminal Server Port 1-4 interfaces **must not** be metallically connected to interfaces which connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring.

Table 4-4. RJ-45 Connector Pin Assignments

Pin	Function
1	TX+
2	TX–
3	RX+
4	No Connect
5	No Connect
6	RX–
7	No Connect
8	No Connect

Terminal Server Ports

The four Terminal Server port RS-232 interfaces located on the front panel are used to remotely connect to RS-232 managed devices.

CAUTION

The 8-pin modular Terminal Server Port 1-4 jacks should never be connected to a telecommunications network and are intended for connection to RS-232 data interfaces only.

The Terminal Server ports are accessed by establishing a Telnet session to the MX410/MX412 with the TCP Port Number of the particular port. The pin assignments for the RS-232 connector are listed in Table 4-5.

Table 4-5. RS-232 Connector Pin Assignments

Pin	Function
1	GND
2	No Connect
3	TXD
4	No Connect
5	RXD
6	No Connect
7	No Connect
8	No Connect

Alarm Cutoff Switch

The Alarm Cutoff (**ACO**) Switch turns off audible and visual alarms connected to the alarm relays. Press the ACO Switch to acknowledge alarms.

Craft Port

The DB-9 (RS-232) **CRAFT** port is used to connect the MX410/MX412 to a VT100 terminal or VT100 terminal emulation software package such as HyperTerminal or ProComm Plus.

FXS Port

The **FXS** port (MX412 only) provides a 2-wire analog interface between a Voice Frequency (VF) transmission and a signaling facility. The FXS interface provides for simultaneous signaling in each direction for use with 2-wire off-premises station lines, carrier extended PBX trunks, or subscriber line foreign exchanges using a loop start signaling system. FXS options are listed in Table 4-6.

Table 4-6. FXS Options

Mode	Description
Loop Start	Selects ANSI T1.403 FXS Loop Start mode of operation.
PLAR D4	Selects Private Line Automatic Ringdown where onhook = 00. Signaling must match the PLAR unit at the distant end.
PLAR D3	Selects Private Line Automatic Ringdown where onhook = 11. Signaling must match the PLAR unit at the distant end.
FX Ringdown	PLAR mode of operation that allows for an FXS Loop Start unit on the distant end.

WARNING

The FXS Port interface **must not** be metallically connected to interfaces which connect to the OSP or its wiring. The FXS interface is designed for use as an intra-building interface only. The addition of Primary Protectors is not sufficient protection in order to connect the FXS interface metallically to OSP wiring.

PSU Slots (MX410 Only)

The MX410 houses up to two hot-swappable PSUs that can provide power redundancy. At least one PSU (P/N 1189501L1) must be inserted into the MX410 for the system to function. To remove a PSU, remove the screws that hold it in place and carefully pull the PSU straight out of the MX410. A blank PSU cover (P/N 1189502L1) should be used to cover an unused PSU slot. After power is applied and a PSU is inserted, refer to "LED Indicators" on page 4-10 for the MX410 status.

The MX412 contains an internal power supply.

LED Indicators

The LEDs on the front panel of the MX410/MX412 indicate the status of the power, DS1, Ethernet, and alarm interfaces. See Table 4-7 for a listing of the LEDs and their indications.

Table 4-7. LED Indications

Label	Status		Description
ACT	●	Green	Normal operation
	●/●	Green/Amber (Alternating)	Normal operation and console session is open
	●	Amber	Software transfer in progress
	●/●	Red/Amber (Alternating)	Self-test failed and console session is open
	●	Red	Self-test failed
	✷	Flashing Red	Unit failure
ALM	●	Green	No critical, major, or minor alarms
	●	Amber	Active acknowledged non-critical alarm
	✷	Flashing Amber	Active acknowledged critical alarm
	●	Red	Major or minor alarm in progress
	✷	Flashing Red	Critical alarm in progress
PSU (A/B) **(MX410 only)**	●	Green	Normal operation
	●	Red	PSU failure
DS1 **(1-4) MX410** **(1-12) MX412**	○	Off	Port disabled
	●	Green	Enabled and normal operation
	●	Amber	Locally originated test in progress
	✷	Flashing Amber	Remotely originated test in progress
	●	Red	Non-critical DS1 alarm in progress (for example, AIS)
	✷	Flashing Red	DS1 LOS (critical DS1 alarm; non-critical system alarm)
	✷	1 Second Flashing Red	Single code violation or burst of code violations just occurred
ETHERNET **(1-4)**	○	Off	Link not established
	●	Green	Link established
	●/●	Green/Amber (Alternating)	Activity on the line

TURN-UP

The following sections provide turn-up steps for applying power and logging in to the MX410/MX412.

Power Up

To power up the MX410/MX412, perform the following steps:

1. Connect the MX410/MX412 to a reliably grounded –48 VDC or ±24 VDC source, which is electrically isolated from the AC source.

> **NOTE**
>
> A readily accessible disconnect device, such as a rackmount fuse and alarm panel that is suitably approved and rated should be incorporated into the fixed wiring.
>
> The branch circuit overcurrent protection should be a slow-blow fuse or circuit breaker rated 2 amps or greater.

   a. Determine which fuse pairs are to supply power to the chassis.

   b. Remove the fuses from the A and B slots for the pair.

   c. Pull the power connector straight out from the back of the MX410/MX412.

2. Install the power connector for DC power feeds A and B by connecting **RET A**, **PWR A**, **RET B**, and **PWR B** to the power connector. **PWR** refers to respective –48 VDC or ±24 VDC power sources, while **RET** refers to respective returns.

   a. Insert the power wires into the power connector and tighten the hold-down screws on the top of the power connector.

   b. Insert the power connector into the MX410/MX412 and tighten the two screws on the front of the power connector.

> **WARNING**
>
> Installing the power connector at this stage provides power to the MX410/MX412. The pins and connectors on the rear panel and inside the chassis are powered. Exercise caution to avoid electrical shock.

3. Apply power and check voltages.

   a. Install appropriate fuses (2 amp slow-blow) in the slots in the fuse and alarm panel that services the MX410/MX412.

   b. Using a voltmeter, verify that the operating voltage is within the specifications for A or B power feeds.

   The A and B input voltage power feeds specifications are as follows:

- –48 VDC systems: –42 VDC to –60 VDC
- –24 VDC systems: –22 VDC to –27 VDC
- +24 VDC systems: +22 VDC to +27 VDC

Place the common (normally black) lead of the voltmeter on the **RET A** post of the DC power terminal block and the DC volts (normally red) lead on the **PWR A** post of the DC power terminal block.

c. Repeat step 3 for the **RET B**/**PWR B** connections.

4. Install at least one PSU into the MX410 front panel **PSU A** or **PSU B** slot.

a. Line up the PSU with the guide grooves and carefully insert the unit into the MX410 until it seats all the way into the PSU slot of the MX410.

b. Tighten the thumb screws to secure the PSU in place.

To remove a PSU, remove the thumb screws that hold the PSU in place and carefully pull the PSU straight out of the MX410.

Refer to "LED Indicators" on page 4-10 for LED indication of successful power turn-up.

Section 5
User Interface

INTRODUCTION

This section provides detailed information on the following:

- "System Management" on page 5-1
- "Logging on to the MX410/MX412" on page 5-2
- "Menu Structure" on page 5-3
- "Menu Layout and Navigation" on page 5-4
- "Menu Trees" on page 5-5
- "Menu Descriptions" on page 5-15

SYSTEM MANAGEMENT

MX410/MX412 management and provisioning is facilitated by a series of intuitive menus that are accessible on a computer screen. The MX410/MX412 provides two methods for management access:

- "Craft Interface" on page 5-1
- "Telnet Session" on page 5-2

Craft Interface

Connection to the MX410/MX412 menus can be made through the DB-9 connector, labeled **CRAFT**, on the front of the MX410/MX412. A DB-9 straight cable is required.

Most personal computers or laptops can run communications software that will emulate a VT100 terminal. Windows programs such as Terminal or HyperTerminal are two such examples in the Windows format, but there are many other adequate, commercially available software packages, virtually all of which allow the PC or laptop to emulate a VT100 terminal. Certain configuration items must be set on a PC or laptop to act as a VT100 terminal for the MX410/MX412 as follows:

1. Set the parameters of the communications software to the following settings:
   - Data Rate: 115200 bps
   - Asynchronous Data Format as follows:
     - Eight data bits

- No parity (none)
- One stop bit
- No flow control

2. Set the PC for direct connect on the appropriate communications port (as opposed to dial up connection).
3. Plug the male end of the data cable into the MX410/MX412. Make connection to the PC or laptop as appropriate for the equipment.

Telnet Session

To access the MX410/MX412, use an appropriate Telnet client to access the management interface of the MX410/MX412 at the configured IP address.

LOGGING ON TO THE MX410/MX412

To log on to the MX410/MX412, perform the following steps:

1. Establish the physical connection to the MX410/MX412 using a craft port session, or enter the default IP address "192.168.100.1" with a subnet mask of "255.255.0.0" to establish a Telnet session.
2. Enter the default username "ADMIN" in all capital letters, and press ENTER.
3. Enter the default password "PASSWORD" in all capital letters, and press ENTER.

NOTE

Login username and password fields are case sensitive. The default values are all uppercase.

MENU STRUCTURE

The menu structure for the MX410/MX412 is a layered menu tree. Each layer of the menu tree is displayed as a menu or a screen. This section defines the terminology used in conjunction with the MX410/MX412 menu system.

NOTE

To view the MX410/MX412 menu tree, refer to "Menu Trees" on page 5-5.

Menu

A menu is a display that provides numbered selections that are used to navigate to related menus, modify provisioning information, or display information screens. A menu can contain the following objects:

- Menu Option: A menu option is indicated by a number which, when selected, navigates the display to another menu layer or is used to change the option setting.
- Read-only Field: A read-only field displays information that cannot be changed. The information displayed in a read-only field can be static or can be automatically updated by the MX410/MX412.
- Read-write Field: A read-write field displays information that, when selected, can be modified.

Screen

A screen is a display that usually indicates the end of a menu tree path. A screen can contain the following objects:

- Read-only Field: A read-only field displays information that cannot be changed. The information displayed in a read-only field can be static or can be automatically updated by the MX410/MX412.
- Read-write Field: A read-write field displays information that, when selected, can be modified.
- Keyboard Commands: A keyboard command is a key or combination of keys that are assigned to a function (see Table 5-1). Keyboard commands are indicated by the required key(s) and a brief description (that is, CTRL+A - acknowledge all alarms).

MENU LAYOUT AND NAVIGATION

Figure 5-1 illustrates the basic menu layout used in the MX410/MX412 menu system. The MX410/MX412 Menu Layout figure is general in nature, and not all menus contain all of the elements shown in the figure.

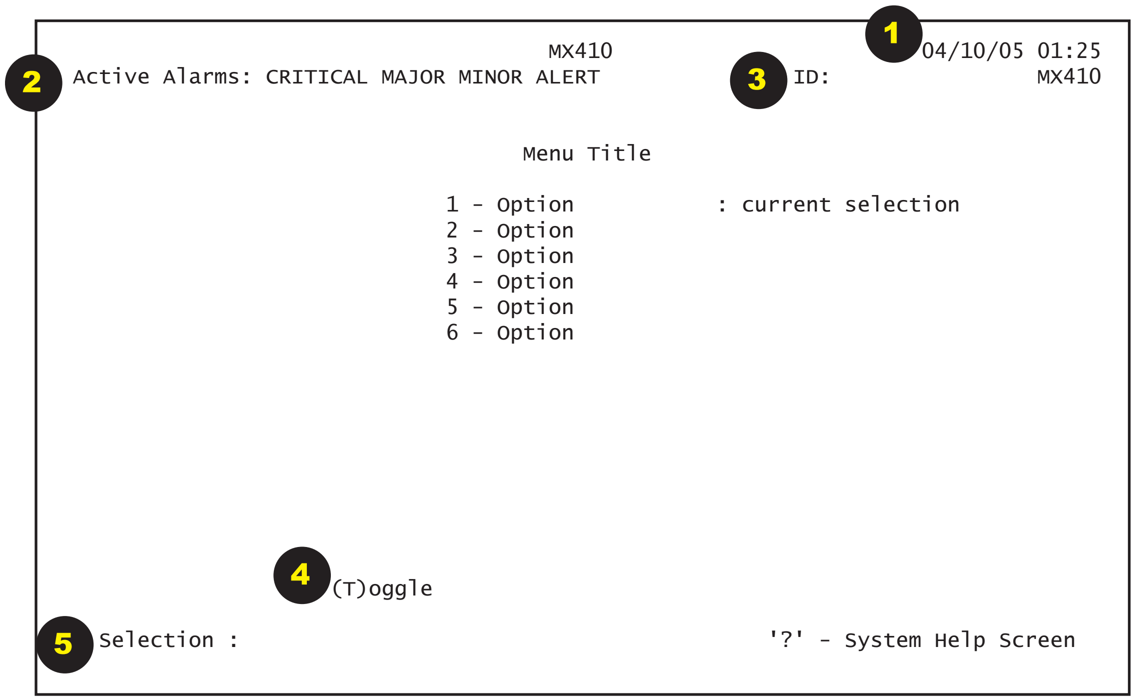


Figure 5-1. MX410/MX412 Menu Layout

Descriptions for the menu features (numbered circles) shown in Figure 5-1 are as follows:

1. Current Date and Time: Displays the factory set date and time. The date and time can be set from the Quick Setup menu or the General Provisioning menu.
2. Alarm Banner: Displays a summary of the currently active alarms. If there are any active Critical Alarms that have not been acknowledged, a flashing reverse video CRITICAL appears in the alarm banner. If there are no active unacknowledged Critical alarms but there are currently active acknowledged critical alarms, a solid reverse video CRITICAL appears in the alarm banner. If there are no active Critical Alarms, nothing will be displayed for CRITICAL in the alarm banner. Major, Minor, and Alert alarm severities are displayed in the same manner. Alarm severities are (in descending order): Critical, Major, Minor, Alert, and Info. Info alarms are not displayed in the menu alarm banner.
3. System ID: A 20-character field that displays the system ID, which can be set from the Quick Setup menu or the General Provisioning menu.
4. Hot Key: A hot key is a key or combination of keys that are assigned to a function. Hot keys are indicated by the required key(s) and a brief description (that is, (T)oggle). Pressing the T key toggles between interfaces or shows more information.
5. Selection: An echo field that displays user input. Selection values are applied by pressing ENTER. Selection values are cleared by pressing the ESC or BACKSPACE key.

Basic menu navigation is accomplished by selecting the desired option number and then pressing ENTER. To return to the previous menu, press the ESC (escape) key. The System Help screen can be accessed from any MX410/MX412 screen or menu by pressing "?".

Table 5-1 shows the general keyboard commands for the MX410/MX412.

Table 5-1. MX410/MX412 Keyboard Commands

Keyboard Command	Description
BACKSPACE	This keyboard command is used to delete the character to left of the cursor during keyboard input.
ENTER (or Return)	This keyboard command is used to terminate input.
ESC	This keyboard command is used to return to the previous menu or to clear partial data input.
CTRL+A (Control and a)	This keyboard command is used to acknowledge all alarms.
CTRL+C or D (Control and c or d)	This keyboard command is used to logout and disconnect.
CTRL+R (Control and r)	This keyboard command is used to refresh the display.

MENU TREES

Menu trees are maps that can be used to locate provisioning options with ease. This subsection provides a detailed set of menu trees for the MX410/MX412. Some of the menu trees span multiple pages, signified by the "(Continued)" at the end of the illustration title.

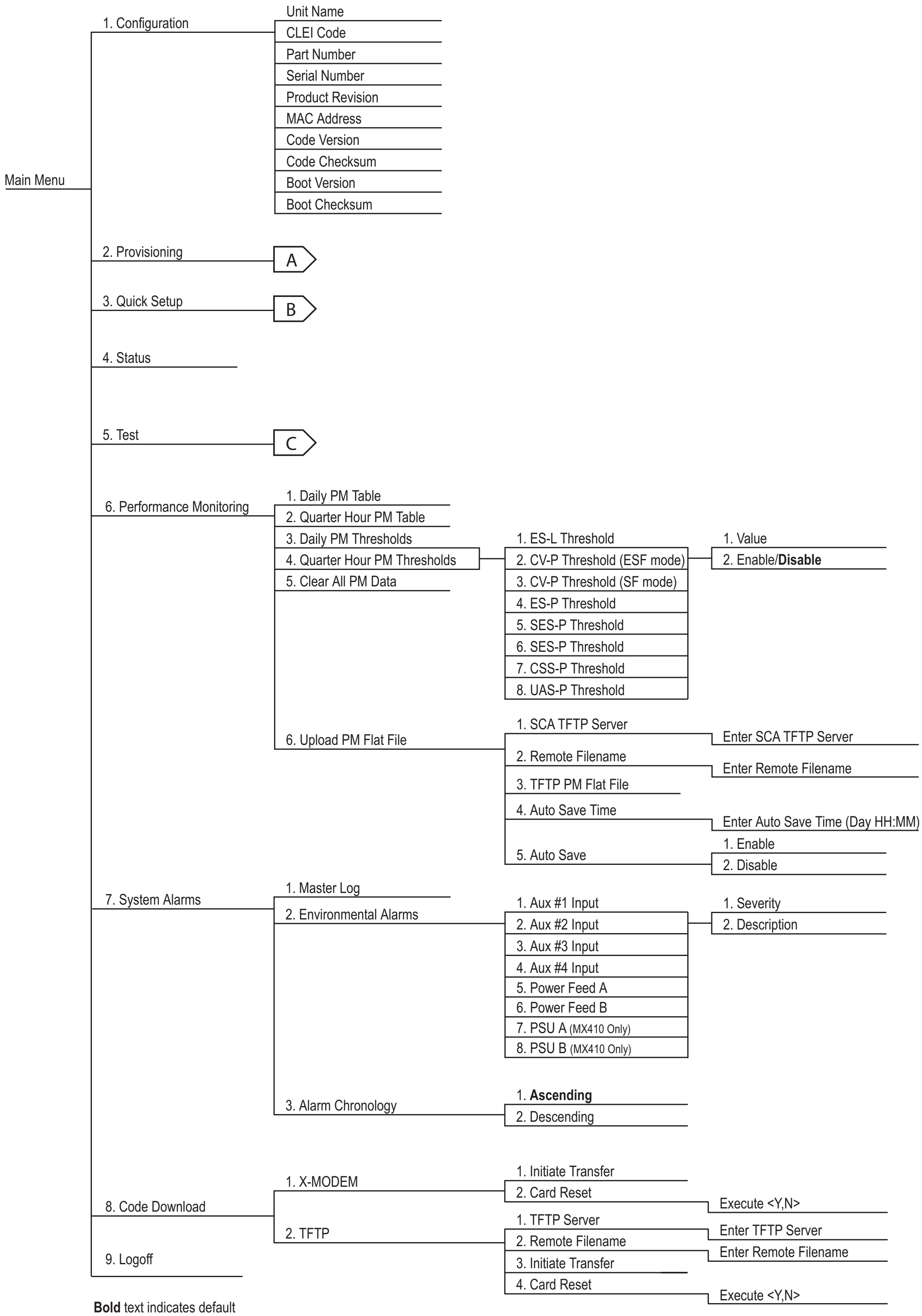


Figure 5-2. MX410/MX412 Main Menu Tree

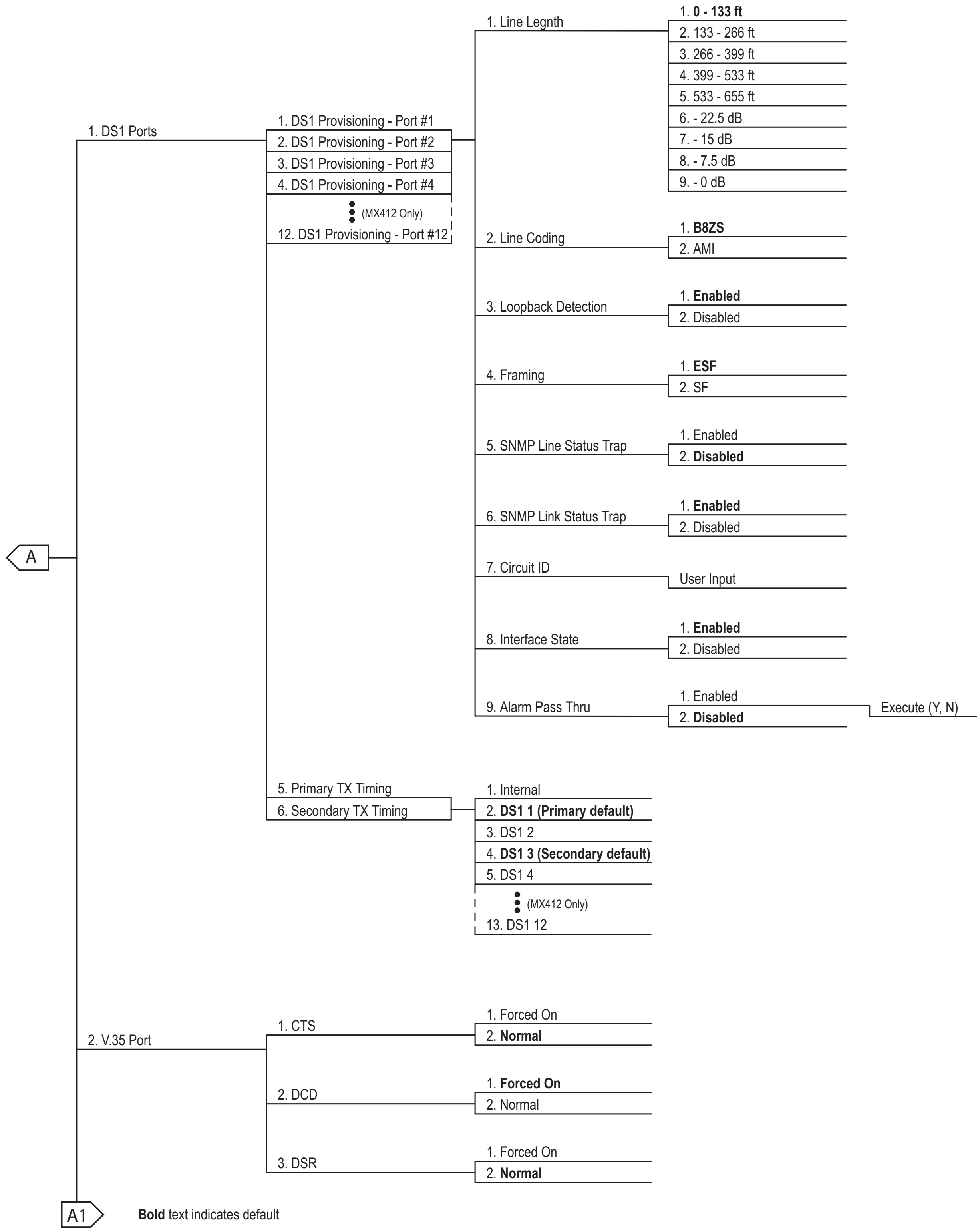


Figure 5-3. MX410/MX412 Provisioning Menu Tree

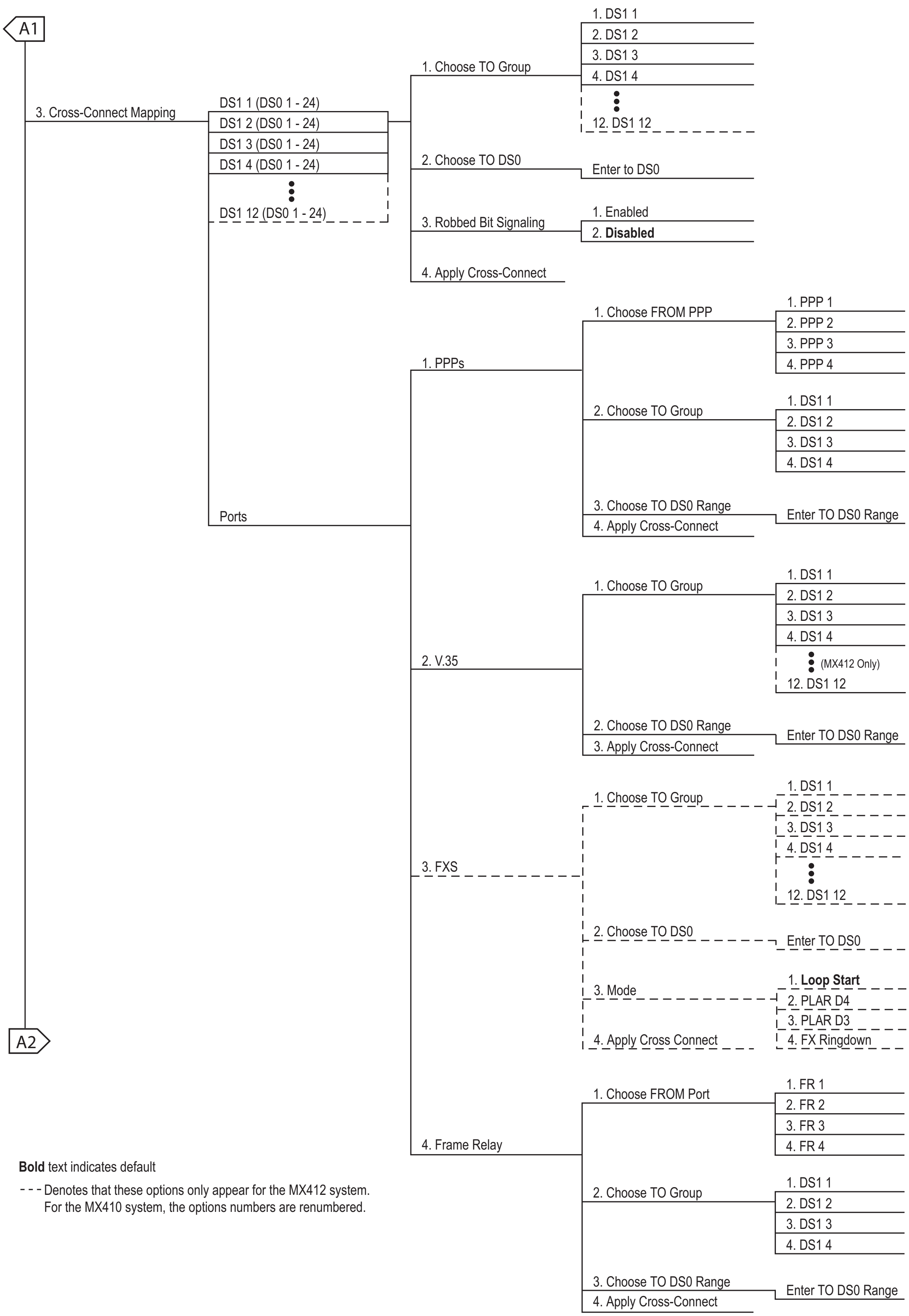


Figure 5-4. MX410/MX412 Provisioning Menu Tree (Continued)

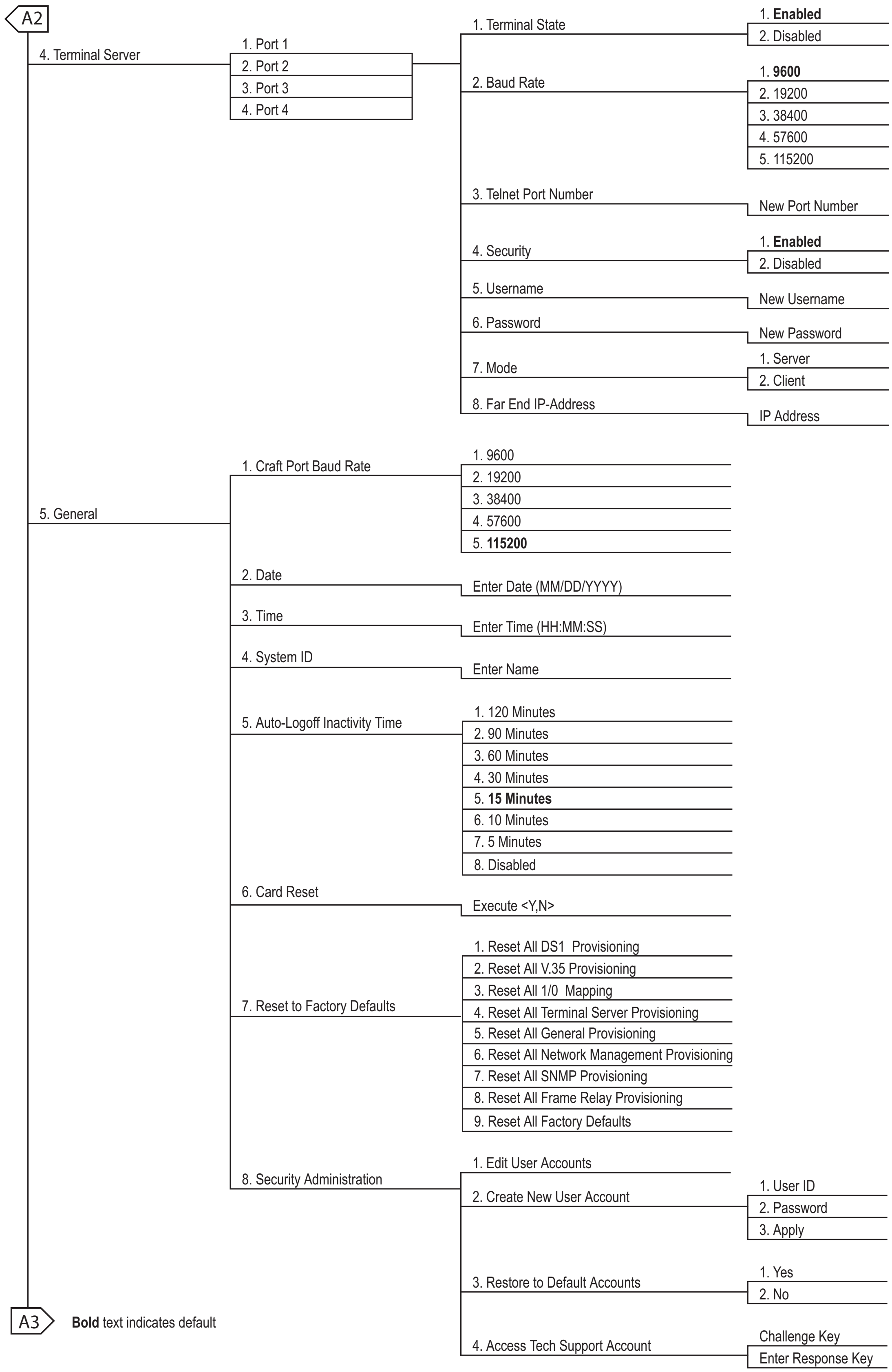


Figure 5-5. MX410/MX412 Provisioning Menu Tree (Continued)

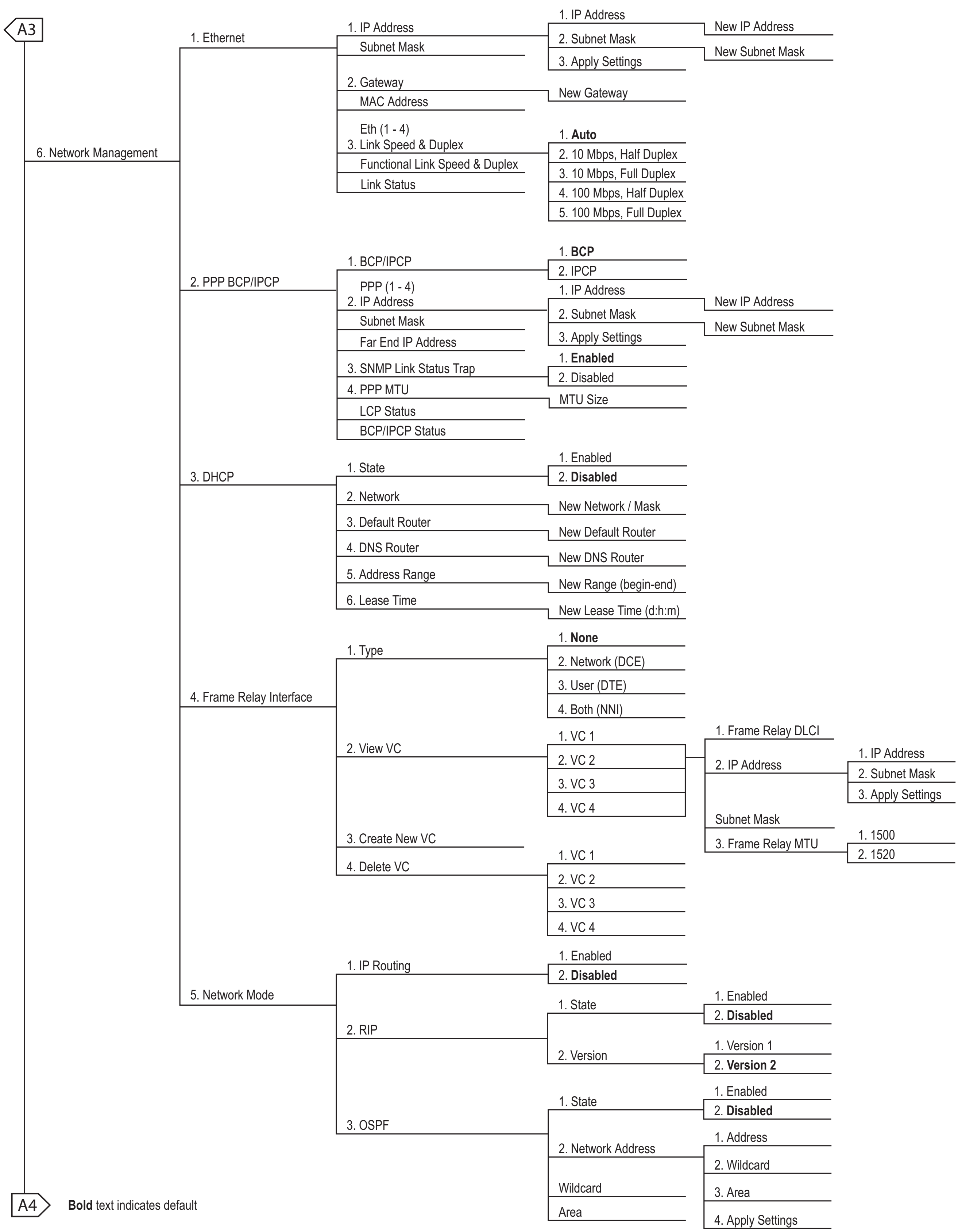


Figure 5-6. MX410/MX412 Provisioning Menu Tree (Continued)

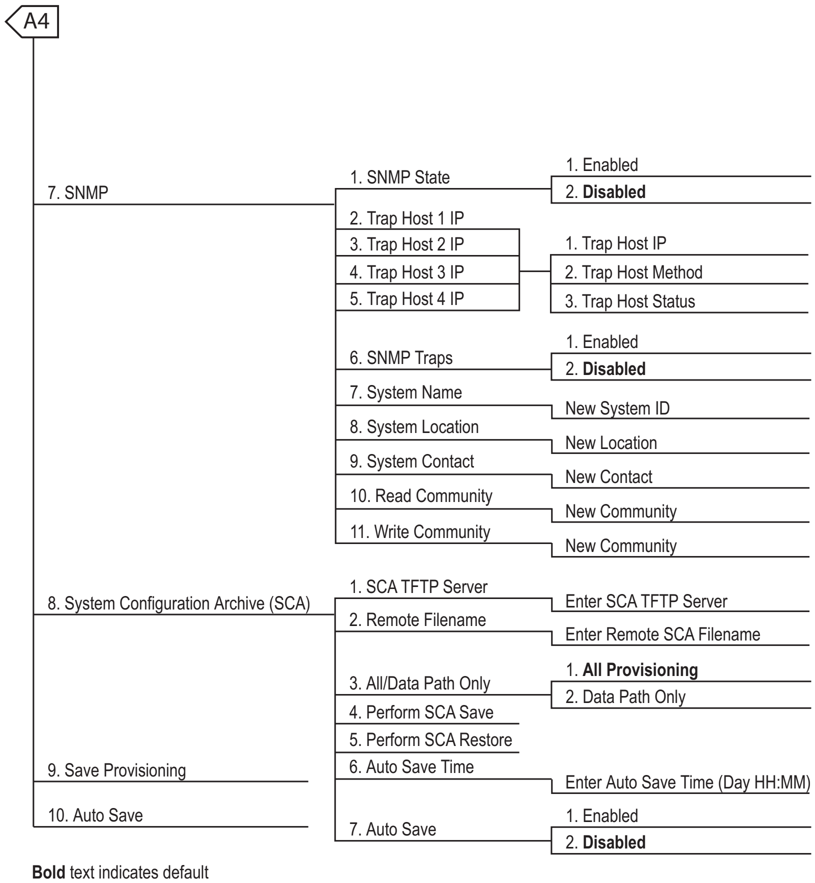


Figure 5-7. MX410/MX412 Provisioning Menu Tree (Continued)

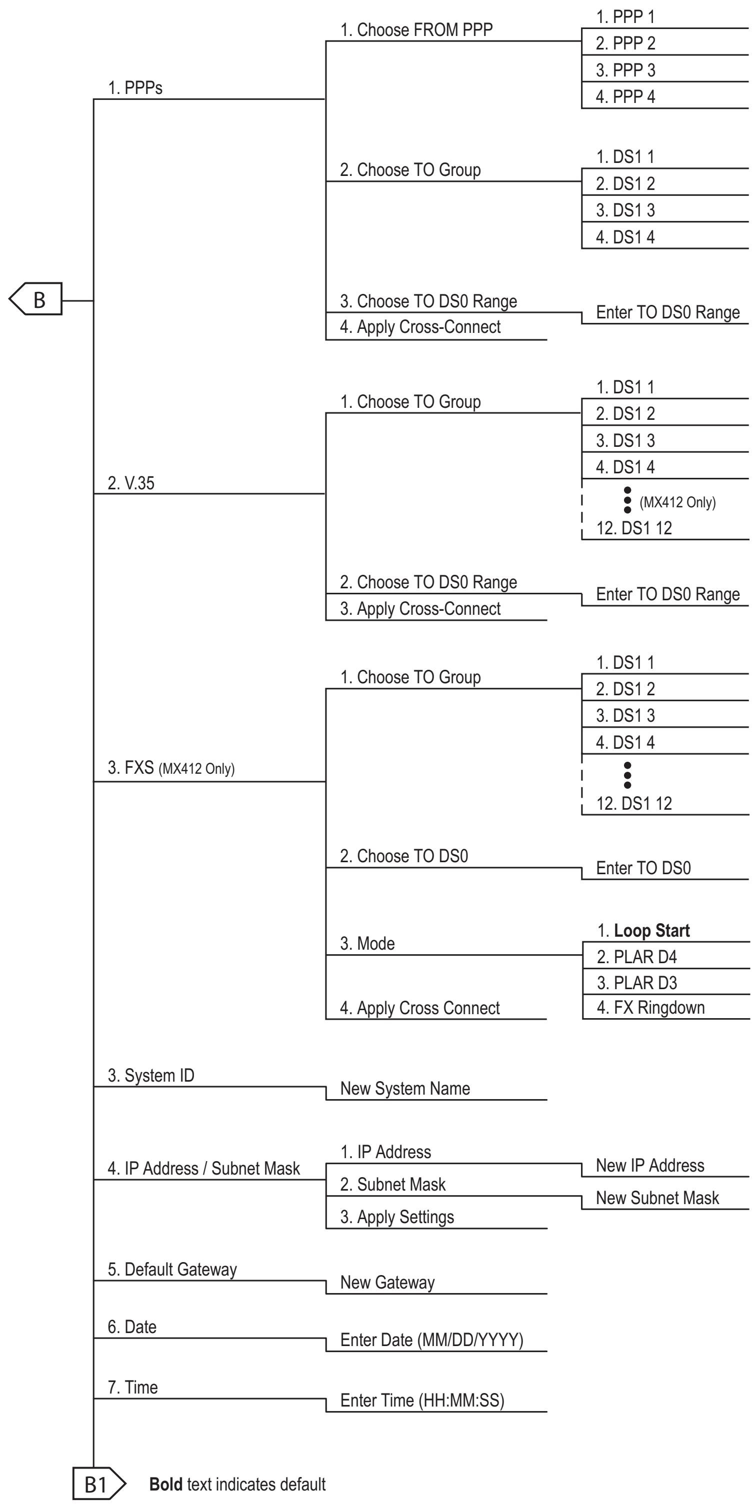


Figure 5-8. MX410/MX412 Quick Setup Menu Tree

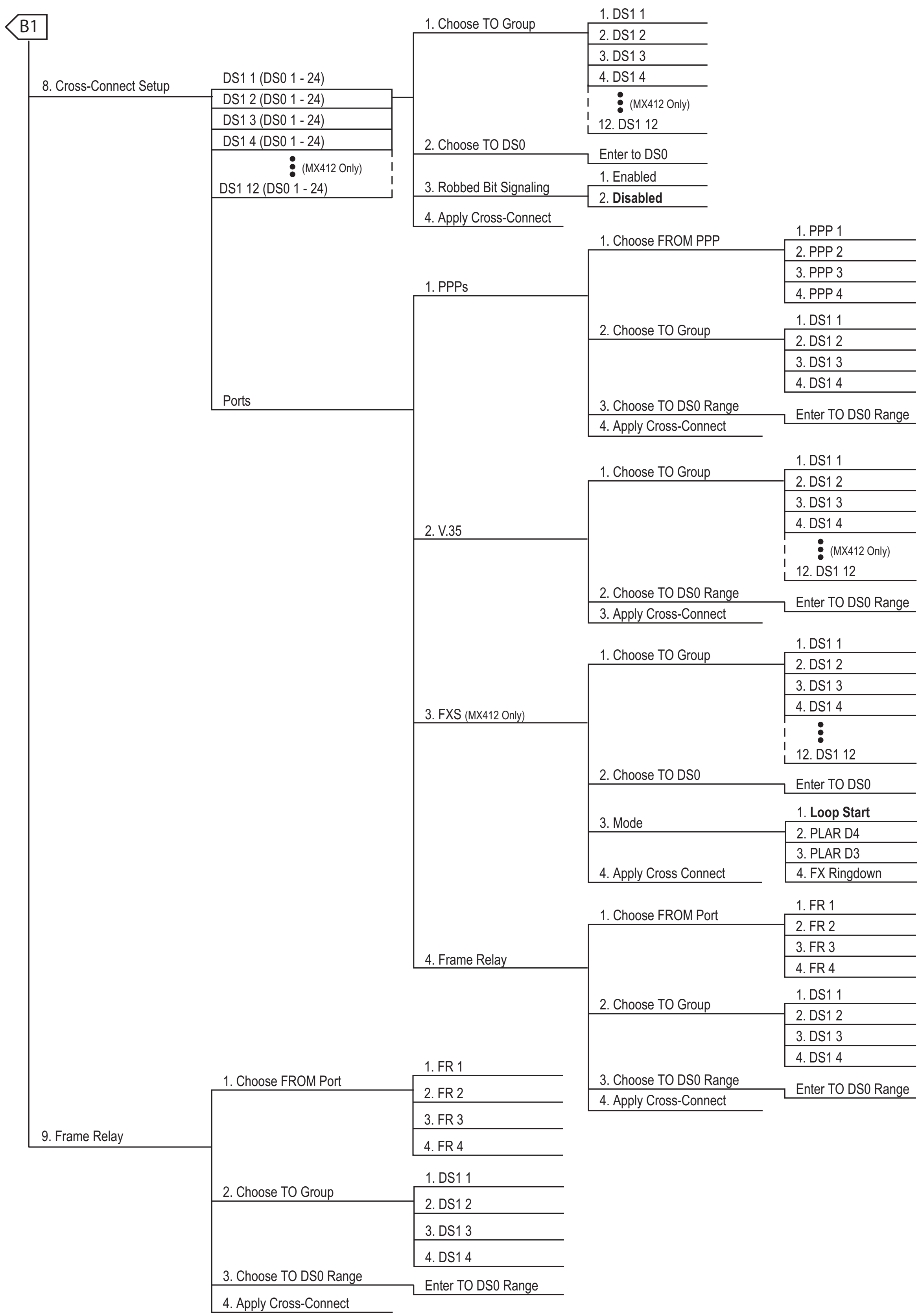


Figure 5-9. MX410/MX412 Quick Setup Menu Tree (Continued)

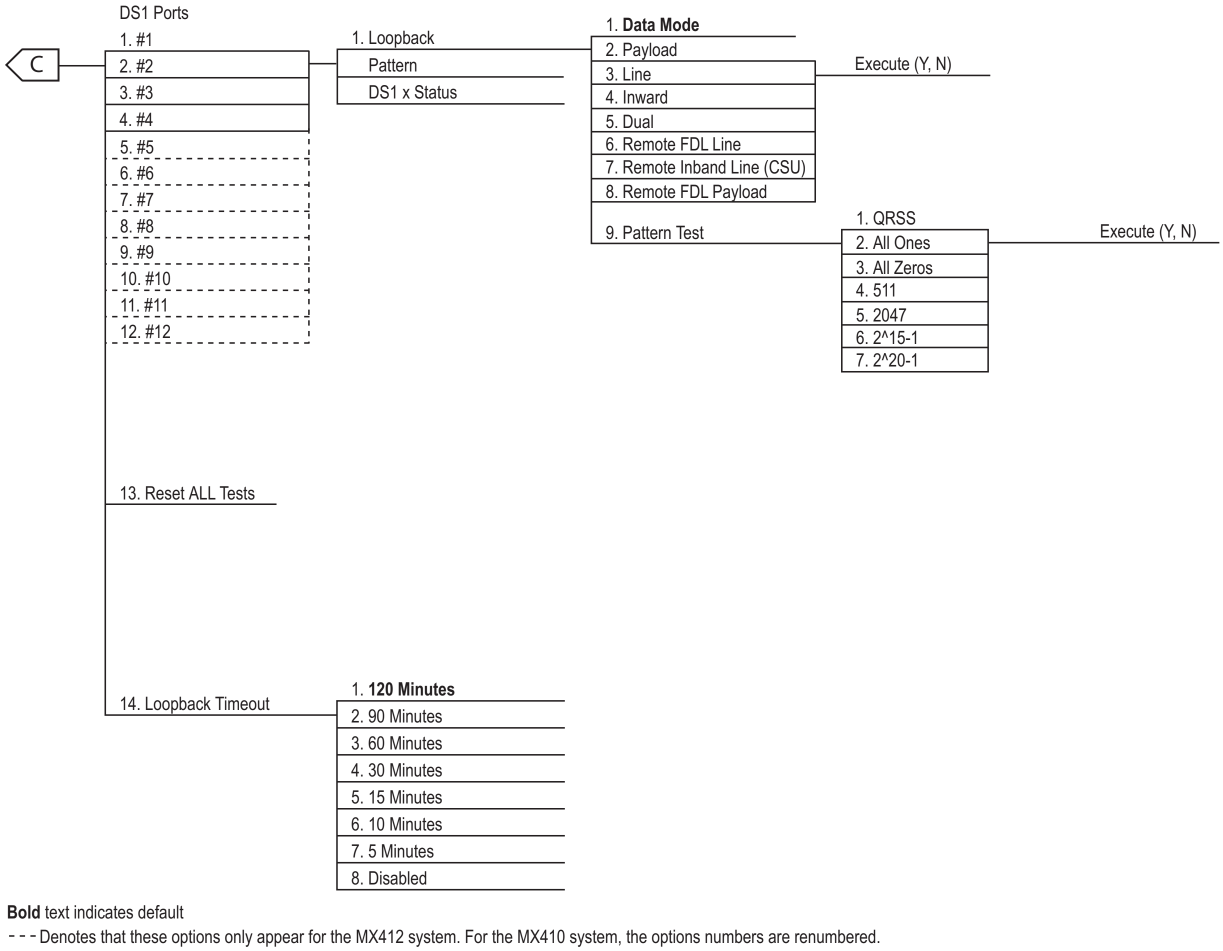


Figure 5-10. MX410/MX412 Test Menu Tree

MENU DESCRIPTIONS

The MX410/MX412 Main Menu (see Figure 5-11) is the access point to all other operations. Each Main Menu item has several functions and submenus that identify and provide access to specific operations and parameters.

```
                                    MX410                            MM/DD/YY HH:MM
Active Alarms: CRITICAL MAJOR MINOR                     ID:                   MX410


                                  Main Menu

                             1 - Configuration
                             2 - Provisioning
                             3 - Quick Setup
                             4 - Status
                             5 - Test
                             6 - Performance Monitoring
                             7 - System Alarms

                             8 - Code Download

                             9 - Logoff




  Selection :                                          '?' - System Help Screen
```

Figure 5-11. MX410/MX412 Main Menu

The MX410/MX412 Main Menu options are listed in Table 5-2.

Table 5-2. MX410/MX412 Main Menu Options

Option	Description	Function
1	Configuration	This option displays the “Configuration Screen” on page 5-16.
2	Provisioning	This option displays the “Provisioning Menu” on page 5-18.
3	Quick Setup	This option displays the “Quick Setup Menu” on page 5-52.
4	Status	This option displays the “Status Screens” on page 5-54.
5	Test	This option displays the “Test Menu” on page 5-58.
6	Performance Monitoring	This option displays the “Performance Monitoring Menu” on page 5-62.
7	System Alarms	This option displays the “System Alarms Menu” on page 5-74.
8	Code Download	This option displays the “Code Download Method Menu” on page 5-77.
9	Logoff	This option is used to end an MX410/MX412 menus session. No further menus, screens, or confirmation dialog boxes are presented.

Configuration Screen

The Configuration Screen (see Figure 5-12) displays information about the MX410/MX412. Some information is updated automatically, such as Code Version changes as upgrades are performed. The CLEI Code and Part Number can be used to search for related information on the ADTRAN website or to order additional parts. Some information from this menu may be required when calling ADTRAN Technical Support.

```
                                      MX410                         MM/DD/YY HH:MM
Active Alarms: CRITICAL                                   ID:                MX410


                                  Configuration

                        Unit Name          : MX410
                        CLEI Code          : M3M1310BRA
                        Part Number        : 1189500L1
                        Serial Number      : DVTUUTNXXX
                        Product Revision   : B
                        MAC Address        : XX:XX:XX:XX:XX:XX
                        Code Version       : B01
                        Code Checksum      : ADCDEFGH
                        Boot Version       : B03
                        Boot Checksum      : 7C22




                                                       '?' - System Help Screen
```

Figure 5-12. Configuration Screen

The Configuration screen fields are listed in Table 5-3.

Table 5-3. MX410/MX412 Configuration Screen Fields

Field	Description
Unit Name	This field displays the MX410/MX412 unit name.
CLEI Code	This field displays the Common Language Equipment Identifier (CLEI) code of the MX410/MX412.
Part Number	This field displays the MX410/MX412 part number.
Serial Number	This field displays the serial number of the MX410/MX412.
Product Revision	This field displays the hardware product assembly revision of the MX410/MX412.
MAC Address	This field displays the factory programmed Media Access Control (MAC) or physical layer address for the MX410/MX412.
Code Version	This field displays the current firmware revision level of the MX410/MX412.

Table 5-3. MX410/MX412 Configuration Screen Fields (Continued)

Field	Description
Code Checksum	This field displays the checksum of the current firmware revision level of the MX410/MX412.
Boot Version	This field displays the Boot ROM software revision code of the MX410/MX412.
Boot Checksum	This field displays the checksum of the Boot ROM software revision code of the MX410/MX412.

Provisioning Menu

The Provisioning Menu (see Figure 5-13) is used to configure and change the operating characteristics of the MX410/MX412. Some options control traffic through the MX410/MX412 by affecting the DS1, V.35, terminal server ports and cross-connect mapping while other options affect overall operation, Network Management, SNMP and System Configuration Archive (SCM) of the MX410/MX412.

```
                                   MX410                      MM/DD/YY HH:MM
Active Alarms: CRITICAL MAJOR MINOR                     ID:            MX410


                               Provisioning


                        1 - DS1 Ports
                        2 - V.35 Port

                        3 - Cross-Connect Mapping
                        4 - Terminal Server Ports

                        5 - General
                        6 - Network Management
                        7 - SNMP
                        8 - System Configuration Archive (SCA)
                        9 - Save Provisioning
                       10 - Auto Save              : Enabled



  Selection :                                    '?' - System Help Screen
```

Figure 5-13. Provisioning Menu

The Provisioning menu options are listed in Table 5-4.

Table 5-4. Provisioning Menu Options

Option	Description	Function
1	DS1 Ports	This option displays the "DS1 Ports Menu" on page 5-20.
2	V.35 Port	This option displays the "V.35 Port Menu" on page 5-26.
3	Cross-Connect Mapping	This option displays the "Cross-Connect Mapping Menu" on page 5-27.
4	Terminal Server Ports	This option displays the "Terminal Server Ports Menu" on page 5-30.
5	General	This option displays the "General Provisioning Menu" on page 5-33.
6	Network Management	This option displays the "Network Management Menu" on page 5-35.
7	SNMP	This option displays the "SNMP Menu" on page 5-49.

Table 5-4. Provisioning Menu Options (Continued)

Option	Description	Function
8	System Configuration Archive (SCA)	This option displays the "SCA Update Menu" on page 5-51.
9	Save Provisioning	This option is used to save current network settings.
10	Auto Save	This option is used to automatically save current network settings at timed intervals.

DS1 Ports Menu

The DS1 Ports menu (see Figure 5-14) displays line length, line coding, loopback detection, framing, SNMP line status trap, SNMP link status trap, circuit ID, interface state, and alarm pass thru information for DS1 ports 1-4 (1-12 on the MX412), as well as timing information. Selection of an option invokes other menus to set the option variables. The Toggle hot key can be used to view more DS1 port information shown in Figure 5-15.

```
                                      MX410                        MM/DD/YY HH:MM
Active Alarms: CRITICAL MAJOR                            ID:                MX410


                                    DS1 Ports



        Line       Line    Loopback             SNMP Line     SNMP Link
       Length     Coding    Detect   Framing   Status Trap   Status Trap
 1 -   0 - 133 ft  B8ZS    Enabled     ESF      Disabled      Enabled
 2 -   0 - 133 ft  B8ZS    Enabled     ESF      Disabled      Enabled
 3 -   0 - 133 ft  B8ZS    Enabled     ESF      Disabled      Enabled
 4 -   0 - 133 ft  B8ZS    Enabled     ESF      Disabled      Enabled




 5 - Primary TX Timing   - DS1 1
 6 - Secondary TX Timing - DS1 3

                                                      (T)oggle for more
  Selection :                                         '?' - System Help Screen
```

Figure 5-14. DS1 Ports Menu

```
                                      MX410                        MM/DD/YY HH:MM
Active Alarms: CRITICAL MAJOR                            ID:                MX410


                                    DS1 Ports




     Circuit ID                           Interface State     Alarm Pass Thru
 1 -                                          Enabled            Disabled
 2 -                                          Enabled            Disabled
 3 -                                          Enabled            Disabled
 4 -                                          Enabled            Disabled




 5 - Primary TX Timing   - DS1 1
 6 - Secondary TX Timing - DS1 3

                                                      (T)oggle for more
  Selection :                                         '?' - System Help Screen
```

Figure 5-15. DS1 Ports Menu - Toggled

The DS1 Ports menu options are listed in Table 5-5.

Table 5-5. DS1 Ports Menu Options

Option	Description	Function
1	DS1 Port #1	This option displays the "DS1 Provisioning Menu" on page 5-22.
2	DS1 Port #2	This option displays the "DS1 Provisioning Menu" on page 5-22.
3	DS1 Port #3	This option displays the "DS1 Provisioning Menu" on page 5-22.
4	DS1 Port #4	This option displays the "DS1 Provisioning Menu" on page 5-22.
5	Primary TX Timing	This option displays the "Primary Timing Mode Menu" on page 5-24.
6	Secondary TX Timing	This option displays the "Secondary Timing Mode Menu" on page 5-25.

DS1 Provisioning Menu

The DS1 Provisioning menu (see Figure 5-16) is used to set the line length, line coding, loopback detection, framing, SNMP line status trap, SNMP link status trap, circuit ID, interface state, and alarm pass thru information for the selected DS1 port.

```
                                     MX410                          MM/DD/YY HH:MM
Active Alarms: CRITICAL MAJOR                              ID:               MX410


                          DS1 Provisioning - Port #1


             1 - Line Length              : 0 - 133 ft
             2 - Line Coding              : B8ZS
             3 - Loopback Detection       : Enabled
             4 - Framing                  : ESF
             5 - SNMP Line Status Trap    : Disabled
             6 - SNMP Link Status Trap    : Enabled
             7 - Circuit ID               :
             8 - Interface State          : Enabled
             9 - Alarm Pass Thru          : Disabled






  Selection :                                        '?' - System Help Screen
```

Figure 5-16. DS1 Provisioning Menu

The DS1 Provisioning menu options are listed in Table 5-6.

Table 5-6. DS1 Provisioning Menu Options

Option	Description	Function
1	Line Length	This option sets the line length (line build out) for each port interface according to the distance from the MX410/MX412 to the other device. Options for line length are as follows: • Set line length from 0 to 133 feet • Set line length from 133 to 266 feet • Set line length from 266 to 399 feet • Set line length from 399 to 533 feet • Set line length from 533 to 655 feet • –22.5 dB • –15 dB • –7.5 dB • 0 dB

Table 5-6. DS1 Provisioning Menu Options (Continued)

Option	Description	Function
2	Line Coding	This option sets the line code for each individual port interface to match the connected device. Options for line coding are as follows: • AMI • B8ZS
3	Loopback Detection	This option enables or disables a port to respond to CSU and FDL loopback requests coming from the network.
4	Framing	This option sets the framing. Options for framing are as follows: • ESF (Extended Super Frame) • SF (Super Frame)
5	SNMP Line Status Trap	This option enables or disables the SNMP line status trap state.
6	SNMP Link Status Trap	This option enables or disables the SNMP link status trap state.
7	Circuit ID	This option contains a user-configurable text string field to name the selected port. This field accepts up to 32 alphanumeric characters, including spaces and special characters.
8	Interface State	This option is viewed using the Toggle hot key and sets the interface state to either enabled or disabled.
9	Alarm Pass Thru	This option enables or disables semi-transparency for visibility through the cross connect to remote devices. This option enables the selected DS1 to transmit RAI when any cross-connected DS1 is in alarm or receiving RAI.

Primary Timing Mode Menu

The Primary Timing Mode menu (see Figure 5-17) is used to set the primary timing mode for the selected DS1 port (1-4 on the MX410 and 1-12 on the MX412).

```
                                MX410                        MM/DD/YY HH:MM
Active Alarms: CRITICAL MAJOR                         ID:              MX410

                        Primary Timing Mode : DS1 1

                                1 - Internal
                                2 - DS1 1
                                3 - DS1 2
                                4 - DS1 3
                                5 - DS1 4

 Selection :                                        '?' - System Help Screen
```

Figure 5-17. Primary Timing Mode Menu

The Primary Timing Mode menu options are listed in Table 5-7.

Table 5-7. Primary Timing Mode Menu Options

Option	Description	Function
1	Internal	This option sets the timing mode to internal.
2	DS1 1	This option sets the timing mode to DS1 1. (Default)
3	DS1 2	This option sets the timing mode to DS1 2.
4	DS1 3	This option sets the timing mode to DS1 3.
5	DS1 4	This option sets the timing mode to DS1 4.

CAUTION

The entire MX410/MX412 is timed from a single source and all transmitters are synchronized. Any device attached to the MX410/MX412 should be placed in loop or line timing mode, unless it is providing timing. If an attached device is providing timing, the MX410/MX412 must be configured to use this interface as its primary timing source. If the MX410/MX412 is set for internal timing, all devices connected to it must be set to loop or line timing.

Secondary Timing Mode Menu

The Secondary Timing Mode menu (see Figure 5-18) is used to set the secondary timing mode for the selected DS1 port (1-4 on the MX410 and 1-12 on the MX412).

```
                                   MX410                       MM/DD/YY HH:MM
Active Alarms: CRITICAL MAJOR                            ID:            MX410


                         Secondary Timing Mode : DS1 3


                                 1 - Internal
                                 2 - DS1 1
                                 3 - DS1 2
                                 4 - DS1 3
                                 5 - DS1 4









  Selection :                                          '?' - System Help Screen
```

Figure 5-18. Secondary Timing Mode Menu

The Secondary Timing Mode menu options are listed in Table 5-8.

Table 5-8. Secondary Timing Mode Menu Options

Option	Description	Function
1	Internal	This option sets the timing mode to internal.
2	DS1 1	This option sets the timing mode to DS1 1.
3	DS1 2	This option sets the timing mode to DS1 2.
4	DS1 3	This option sets the timing mode to DS1 3. (Default)
5	DS1 4	This option sets the timing mode to DS1 4.

CAUTION

The entire MX410/MX412 is timed from a single source and all transmitters are synchronized. Any device attached to the MX410/MX412 should be placed in loop or line timing mode, unless it is providing timing. If an attached device is providing timing, the MX410/MX412 must be configured to use this interface as its primary timing source. If the MX410/MX412 is set for internal timing, all devices connected to it must be set to loop or line timing.

V.35 Port Menu

The V.35 Port menu (see Figure 5-19) is used to provision the V.35 Port.

```
                                   MX410                          MM/DD/YY HH:MM
Active Alarms: CRITICAL                                ID:                 MX410


                                 V.35 Port


                          1 - CTS           : Forced On
                          2 - DCD           : Forced On
                          3 - DSR           : Normal









  Selection :                                        '?' - System Help Screen
```

Figure 5-19. V.35 Port Menu

The V.35 Port menu options are listed in Table 5-9.

Table 5-9. V.35 Port Menu Options

Option	Description	Function
1	CTS	This option sets the CTS (Clear To Send) settings. Options are as follows: • Normal: The setting matches RTS settings. • Forced On: This setting forces CTS to be active.
2	DCD	This option sets the DCD (Data Carrier Detect) settings. Options are as follows: • Normal: The setting matches the status of the connected DS1. • Forced On: This setting forces DCD to be active.
3	DSR	This option sets the DSR (Data Set Ready) settings. Options are as follows: • Normal: The setting follows DTR settings. • Forced On: This setting forces DSR to be active.

Cross-Connect Mapping Menu

The Cross-Connect Mapping menu is used to display DS0 information for the four DS1 ports (12 ports on the MX412), as well as FXS (MX412 only), PPP, and V.35 settings. The Cross-Connect Mapping menu is shown in Figure 5-20 displaying DS0 mapping for the DS1 1 port. The Toggle hot key is used to view DS1 2, DS1 3, DS1 4, PPP, and V.35 data. All of the DS1 toggle menus have identical options, and all of the 24 DS0s have identical options for the selected DS1. The Cross-Connect Mapping Ports toggle menu is shown in Figure 5-21.

```
                                     MX410                            MM/DD/YY HH:MM
Active Alarms: CRITICAL                                        ID:               MX410


                             Cross-Connect Mapping
       DS1 1  - Huntsville T1

  1 - DS0 #1  = DS1 2 DS0 #1           13 - DS0 #13 = DS1 2 DS0 #13
  2 - DS0 #2  = DS1 2 DS0 #2           14 - DS0 #14 = DS1 2 DS0 #14
  3 - DS0 #3  = DS1 2 DS0 #3           15 - DS0 #15 = DS1 2 DS0 #15
  4 - DS0 #4  = DS1 2 DS0 #4           16 - DS0 #16 = DS1 2 DS0 #16
  5 - DS0 #5  = DS1 2 DS0 #5           17 - DS0 #17 = DS1 2 DS0 #17
  6 - DS0 #6  = DS1 2 DS0 #6           18 - DS0 #18 = DS1 2 DS0 #18
  7 - DS0 #7  = DS1 2 DS0 #7           19 - DS0 #19 = DS1 2 DS0 #19
  8 - DS0 #8  = DS1 2 DS0 #8           20 - DS0 #20 = DS1 2 DS0 #20
  9 - DS0 #9  = DS1 2 DS0 #9           21 - DS0 #21 = DS1 2 DS0 #21
 10 - DS0 #10 = DS1 2 DS0 #10          22 - DS0 #22 = DS1 2 DS0 #22
 11 - DS0 #11 = DS1 2 DS0 #11          23 - DS0 #23 = DS1 2 DS0 #23
 12 - DS0 #12 = DS1 2 DS0 #12          24 - DS0 #24 = DS1 2 DS0 #24

  (T)oggle View (DS1 2, DS1 3, DS1 4, Ports)      25 - Map Multiple DS0's

  Selection :                                         '?' - System Help Screen
```

Figure 5-20. Cross-Connect Mapping Menu

```
                                     MX410                            MM/DD/YY HH:MM
Active Alarms: CRITICAL                                        ID:               MX410



                             Cross-Connect Mapping
                                     Ports
                         1 - PPPs
                             PPP 1 = DS1 4 DS0 #1



                         2 - V.35   =
                         3 - FXS    =
                         4 - Frame Relay
                             FR 2 = DS1 1 DS0 #1-2





  (T)oggle View (DS1 1, DS1 2, DS1 3, DS1 4)

  Selection :                                         '?' - System Help Screen
```

Figure 5-21. Cross-Connect Mapping - Ports Menu

The Cross-Connect Mapping menu options are listed in Table 5-10.

Table 5-10. Cross-Connect Mapping Menu Options

Option	Description	Function
1-24	DS0 1-24 connections	These options invoke the Change Cross-Connect Mapping menu which is used to provision the cross-connect settings for the selected DS1 port. Options are as follows: • Choose TO Group (for DS1 1 through DS1 4/DS1 12) • Choose TO DS0: (enter a value) • Robbed Bit Signaling: select Enabled or Disabled • Apply Cross-Connect: applies the selections made from the Change Cross-Connect Mapping menu.
25	Map Multiple DS0's	This option invokes the Change Cross-Connect Mapping menu which is used to provision the cross-connect settings for multiple DS0s at the same time. Options are as follows: • Choose FROM DS0 Range: enter a range • Choose TO Group (for DS1 1 through DS1 4/DS1 12) • Choose TO DS0 Range: enter a range • Robbed Bit Signaling: select Enabled or Disabled • Apply Cross-Connect: applies the selections made from the Change Cross-Connect Mapping menu to all DS0s in the range entered.
Cross-Connect Mapping - Ports		
1	PPPs	This option invokes the Change Cross-Connect Mapping menu, which is used to provision the PPP ports. Options are as follows: • Choose FROM PPP (for PPP 1 through PPP 4) • Choose TO Group (for DS1 1 through DS1 4) • Choose TO DS0 Range: enter a range • Apply Cross-Connect
2	V.35	This option invokes the Change Cross-Connect Mapping menu, which is used to provision the V.35 port. Options are as follows: • Choose TO Group (for DS1 1 through DS1 4/DS1 12) • Choose TO DS0 Range: enter a range • Apply Cross-Connect
3	FXS (MX412 only)	This option invokes the Change Cross-Connect Mapping menu which is used to provision the FXS port. Options are as follows: • Choose TO Group (for DS1 1 through DS1 12) • Choose TO DS0 Range: enter a range • Mode: Select Loop Start, PLAR D4, PLAR D3, or FX Ringdown. Refer to Table 4-6 on page 4-9 for descriptions of these options. • Apply Cross-Connect

Table 5-10. Cross-Connect Mapping Menu Options (Continued)

Option	Description	Function
4	Frame Relay	This option invokes the Change Cross-Connect Mapping menu, which is used to provision the frame relay ports. Options are as follows: • Choose FROM Port (for FR 1 through FR 4) • Choose TO Group (for DS1 1 through DS1 4) • Choose TO DS0 Range: enter a range • Apply Cross-Connect

Terminal Server Ports Menu

The Terminal Server Ports menu (see Figure 5-22) is used to select Terminal Port 1 through Port 4 for provisioning.

```
                              MX410                        MM/DD/YY HH:MM
Active Alarms: CRITICAL                           ID:               MX410


                          Terminal Server Ports


                             1 - Port 1
                             2 - Port 2
                             3 - Port 3
                             4 - Port 4













  Selection :                                   '?' - System Help Screen
```

Figure 5-22. Terminal Server Ports Menu

The Terminal Server Ports menu options are listed in Table 5-11.

Table 5-11. Terminal Server Ports Menu Options

Option	Description	Function
1	Port 1	This option invokes the "Terminal Server Port (1 - 4) Menu" on page 5-31.
2	Port 2	This option invokes the "Terminal Server Port (1 - 4) Menu" on page 5-31.
3	Port 3	This option invokes the "Terminal Server Port (1 - 4) Menu" on page 5-31.
4	Port 4	This option invokes the "Terminal Server Port (1 - 4) Menu" on page 5-31.

Terminal Server Port (1 - 4) Menu

The Terminal Server Port menu (see Figure 5-23) is used to provision the Terminal Sever Port selected on the (previous) Terminal Server Ports menu.

```
                                   MX410                          MM/DD/YY HH:MM
Active Alarms: CRITICAL                             ID:                    MX410


                         Terminal Server Port 1

                     1 - Terminal State          : Enabled
                     2 - Baud Rate               : 9600
                     3 - Telnet Port Number      : 2023
                     4 - Security                : Enabled
                     5 - Username                : port 1
                     6 - Password                : password
                     7 - Mode                    : Server
                     8 - Far End IP-Address      :








  Selection :                                     '?' - System Help Screen
```

Figure 5-23. Terminal Server Port 1 Menu

The Terminal Server Port (1-4) menu options are listed in Table 5-12.

Table 5-12. Terminal Server Port Menu Options

Option	Description	Function
1	Terminal State	This option enables or disables the terminal state.
2	Baud Rate	This option sets the terminal server baud rate. Options are as follows: • 9600 • 19200 • 38400 • 57600 • 115200
3	Telnet Port Number	This option is used to enter a new Telnet port number. For server mode, the valid range is 1024–65535. For client mode, there is no limit.
4	Security	This option is used to enable or disable terminal port security.
5	Username	This option is used to assign a username to the selected port number for use when security is enabled.

Table 5-12. Terminal Server Port Menu Options (Continued)

Option	Description	Function
6	Password	This option is used to assign a password to the selected port number for use when security is enabled.
7	Mode	This option sets Telnet request mode. Options are as follows: • Server (listen for Telnet Requests) • Client (issue Telnet Requests)
8	Far End IP-Address	This option is used to enter the far end IP address.

General Provisioning Menu

The General Provisioning menu (see Figure 5-24) is used to provision the craft port Baud rate, the date, time, system ID, auto-logoff inactivity time, to reset the MX410/MX412, and to handle security administration.

```
                                     MX410                        MM/DD/YY HH:MM
Active Alarms: CRITICAL                                 ID:                MX410


                             General Provisioning

         1 - Craft Port Baud Rate                       : 115200
         2 - Date                                       : 04/22/2005
         3 - Time                                       : 18:50:47
         4 - System ID                                  : MX410
         5 - Auto-Logoff Inactivity Time                : 15 minutes

         6 - Card Reset
         7 - Reset To Factory Defaults
         8 - Security Administration





  Selection:                                           '?' - System Help Screen
```

Figure 5-24. General Provisioning Menu

The General Provisioning menu options are listed in Table 5-13.

Table 5-13. General Provisioning Menu Options

Option	Description	Function
1	Craft Port Baud Rate	This option sets the craft port baud rate. Options are as follows: • 9600 • 19200 • 38400 • 57600 • 115200
2	Date	This option is used to enter the date.
3	Time	This option is used to enter the time.
4	System ID	This option defines the alphanumeric name assigned to the MX410/MX412.

Table 5-13. General Provisioning Menu Options (Continued)

Option	Description	Function
5	Auto-Logoff Inactivity Time	This option defines when a menu session automatically terminates due to inactivity. The default setting is 15 Minutes. Options are as follows: • 120 Minutes • 90 Minutes • 60 Minutes • 30 Minutes • 15 Minutes • 10 Minutes • 5 Minutes • Disabled
6	Card Reset	This option forces the MX410/MX412 to reset.
7	Reset to Factory Defaults	This option is used to reset factory defaults by logical groups, or reset all factory defaults at once.
8	Security Administration	This option invokes the Security Administration menu, which is used to manage accounts. Options are as follows: • Users Currently Logged On: This option displays active usernames, access method and address, and the login time. • Edit User Accounts: This option is used to edit user accounts. • Create New User Account: This option is used to create new user accounts. Options are as follows: – User ID: This option is used to enter a new username. – Password: This option is used to enter a new password. – Access Rights: This option is used to select Read, Test, Read/Write, or Admin access privileges. – Apply: This option saves the new user account information. • Restore to Default Accounts: This option is used to restore the accounts default and deletes all previous information by selecting Yes or No. • Access Tech Support Account: This option is used to access the technical support account information by entering a Response Key.

Network Management Menu

The Network Management menu (see Figure 5-25) is used to provision network information.

```
                                      MX410                          MM/DD/YY HH:MM
Active Alarms: CRITICAL MAJOR                               ID:               MX410

                               Network Management

                         1 - Ethernet
                         2 - PPP BCP/IPCP
                         3 - DHCP
                         4 - Frame Relay Interface
                         5 - Network Mode

  Selection :                                         '?' - System Help Screen
```

Figure 5-25. Network Management Menu

The Network Management menu options are listed in Table 5-14.

Table 5-14. Network Management Menu Options

Option	Description	Function
1	Ethernet	This option invokes the "Ethernet Menu" on page 5-36.
2	PPP BCP/IPCP	This option invokes the "PPP BCP/IPCP Menu" on page 5-38.
3	DHCP	This option invokes the "DHCP Server Menu" on page 5-40.
4	Frame Relay Interface	This option invokes the "Frame Relay Menu" on page 5-41.
5	Network Mode	This option invokes the "Network Mode Menu" on page 5-45.

Ethernet Menu

The Ethernet menu (see Figure 5-26) is used to provision Ethernet information.

```
                                      MX410                        MM/DD/YY HH:MM
Active Alarms: CRITICAL                                   ID:                MX410


                                    Ethernet

                 1 - IP Address                      : 192.168.100.1
                     Subnet Mask                     : 255.255.0.0
                 2 - Gateway                         : 192.168.1.1
                     MAC Address                     : XX:XX:XX:XX:XX:XX


       Eth 1


                 3 - Link Speed & Duplex             : Auto
                     Functional Link Speed & Duplex  : Unknown
                     Link Status                     : Down


                     (T)oggle Between Interfaces

  Selection :                                          '?' - System Help Screen
```

Figure 5-26. Ethernet Menu

The Ethernet menu options are listed in Table 5-15.

Table 5-15. Ethernet Menu Options

Option	Description	Function
1	IP Address	This option invokes another menu which is used to enter the IP Address and the Subnet Mask for the MX410/MX412. The IP Address is written in the format XXX.XXX.XXX.XXX, where each 3-digit field has a value between 1 and 255.
N/A	Subnet Mask	This field displays the Subnet Mask. A subnet mask is used to reduce the traffic on each subnetwork by confining traffic to only the subnetwork for which it was intended. A subnet mask makes the entire network more manageable. In effect, each subnet functions as though it were an independent network, keeping local traffic local and forwarding traffic to another subnet only if the address of the data is external to the subnet. The Subnet Mask is written in the format XXX.XXX.XXX.XXX, where each 3-digit field has a value between 1 and 255.
2	Gateway	This option invokes another menu which is used to enter the address of the default gateway/router between the internal network and the external network. The Gateway address is written in the format XXX.XXX.XXX.XXX, where each 3-digit field has a value between 1 and 255.

Table 5-15. Ethernet Menu Options (Continued)

Option	Description	Function
N/A	MAC Address	This read-only field displays the Medium Access Control (MAC) Address. MAC Addresses are location-independent (programmed into the card at manufacture, they relocate when the card does). MAC Addresses are contained in the headers of packets and are used to filter and forward packets.
Eth (1-4)		
3	Link Speed & Duplex	This option invokes another menu which is used to select the data rate setting for Ethernet Port (1-4) on the front panel of the MX410/MX412. Options are as follows: • Auto: This option sets the MX410/MX412 to automatically detect the speed of the attached device. • 10 Mbps, Half Duplex: This option sets the Ethernet interface to transmit or receive at 10 mb/s. • 10 Mbps, Full Duplex: This option sets the Ethernet interface to transmit and receive simultaneously at 10 mb/s. • 100 Mbps, Half Duplex: This option sets the Ethernet interface to transmit or receive at 100 mb/s. • 100 Mbps, Full Duplex: This option sets the Ethernet interface to transmit and receive simultaneously at 100 mb/s.
N/A	Functional Link Speed & Duplex	This read-only field displays the actual data rate of the port.
N/A	Link Status	This read-only field displays the status of the network as being either Up or Down.

PPP BCP/IPCP Menu

Point-to-Point Protocol (PPP) is commonly used for LAN extension and Remote management connectivity. PPP can use one of two upper layer protocols:

- BCP (Bridge Control Protocol): This protocol routes packets based on MAC addresses and allows broadcast traffic to be passed over the PPP link(s). This protocol enables true LAN Extension to be completed. Any device on the LAN can communicate with any other device with the least amount of configuration by the user.
- IPCP (IP Control Protocol): This protocol is used to assign an IP address to each interface of the MX410/MX412. This enables dynamic routing of packets based on the IP address and prohibits broadcast traffic from being passed over the PPP link(s). This protocol requires more IP knowledge and configuration of each device on the network to ensure proper IP routing, Default gateway configuration, as well as avoiding conflicts of networks and DHCP configurations. When IPCP is enabled, the routing protocol can be provisioned from the "Network Mode Menu" on page 5-45.

If using PPP, the T1/FT1 carrying the PPP link should be configured to ESF and B8ZS.

CAUTION

Only one PPP link can be connected between two devices. If more than one PPP link is connected between two devices, it creates an Ethernet LOOP and causes a Packet Storm across the entire Ethernet network.

The PPP BCP/IPCP menu shown in Figure 5-27 is used to provision the PPP ports.

```
                                     MX410                            MM/DD/YY HH:MM
Active Alarms: CRITICAL MAJOR MINOR                    ID:                     MX410


                                 PPP BCP/IPCP

                 1 - BCP/IPCP                      : BCP

       PPP 1

                 2 - IP Address                    : N/A
                     Subnet Mask                   : N/A
                     Far End IP Address            : N/A

                 3 - SNMP Link Status Trap         : Enabled
                 4 - PPP MTU                       : 1500

                     LCP Status                    : Down
                     BCP/IPCP Status               : Down

                     (T)oggle Between Interfaces

  Selection :                                        '?' - System Help Screen
```

Figure 5-27. PPP BCP/IPCP Menu

The PPP BCP/IPCP menu options are listed in Table 5-16.

Table 5-16. PPP BCP/IPCP Menu Options

Option	Description	Function
1	BCP/IPCP	This option is used to select either BCP (Bridge Control Protocol) or IPCP (IP Control Protocol for routing). This option also changes the Routing Mode between disabled and enabled respectively.
PPP (1-4)		
2	IP Address	This option invokes another menu which is used to enter the IP Address, the Subnet Mask for the PPP. The IP Address is written in the format XXX.XXX.XXX.XXX, where each 3-digit field has a value between 1 and 255.
N/A	Subnet Mask	This field displays the PPP Subnet Mask. The Subnet Mask is written in the format XXX.XXX.XXX.XXX, where each 3-digit field has a value between 1 and 255.
N/A	Far End IP Address	This read-only field displays the far-end device IP address.
3	SNMP Link Status Trap	This option invokes another menu which is used to either enable or disable the SNMP link status trap.
4	PPP MTU	This option is used to set the MTU size to 1500 or 1520.
N/A	LCP Status	This read-only field displays the Link Control Protocol (LCP) status as Up or Down.
N/A	BCP/IPCP Status	This read-only field displays the BCP/IPCP status as Up or Down.

DHCP Server Menu

The DHCP (Dynamic Host Configuration Protocol) Server menu, shown in Figure 5-28, is used to provision DHCP server connections.

```
                                     MX410                              MM/DD/YY HH:MM
Active Alarms: CRITICAL MAJOR                              ID:                   MX410


                                  DHCP Server

                    1 - State                 : Disabled
                    2 - Network               : Not Set/Not Set
                    3 - Default Router        : Not Set
                    4 - DNS Router            : Not Set
                    5 - Address Range         : 0.0.0.0-255.255.255.255
                    6 - Lease Time (d:h:m)    : 0:0:0









  Selection :                                            '?' - System Help Screen
```

Figure 5-28. DHCP Server Menu

The DHCP Server menu options are listed in Table 5-17.

Table 5-17. DHCP Server Menu Options

Option	Description	Function
1	State	This option is used to enable or disable the DHCP server.
2	Network	This option invokes another menu which is used to enter a network address and mask (scope of DHCP server).
3	Default Router	This option invokes another menu which is used to enter the new DHCP default router address.
4	DNS Router	This option invokes another menu which is used to enter the new DHCP DNS router address.
5	Address Range	This option invokes another menu which is used to enter the range of leased addresses.
6	Lease Time (d:h:m)	This option invokes another menu which is used to enter the expiration of the lease assigned to the DHCP server time in days, hours, and minutes.

Frame Relay Menu

The Frame Relay menu, shown in Figure 5-29, is used to provision the frame relay. Use T to toggle through the frame relays 1–4.

```
                                  MX410                          MM/DD/YY HH:MM
Active Alarms: CRITICAL MAJOR                         ID:                 MX410


                            Frame Relay 1 : Down


                    1 - Type                      : User
                    2 - View VC
                    3 - Create New VC
                    4 - Delete VC









                    (T)oggle Between Interfaces

  Selection :                                         '?' - System Help Screen
```

Figure 5-29. Frame Relay Menu

The Frame Relay menu options are listed in Table 5-18.

Table 5-18. Frame Relay Menu Options

Option	Description	Function
1	Type	This option displays the "Frame Relay Type Menu" on page 5-42.
2	View VC	This option displays the "View Frame Relay Menu" on page 5-43.
3	Create New VC	This option is used to create a new VC. The VC number is chosen as the next available VC number.
4	Delete VC	This option is used to select a VC for deletion.

The Frame Relay menu hot key is listed in Table 5-19.

Table 5-19. Frame Relay Menu Hot Key

Hot Key	Description
(T)oggle Between Interfaces	This hot key displays the next frame relay interface.

Frame Relay Type Menu

The Frame Relay Type menu, shown in Figure 5-30, is used to select the frame relay type.

```
                              MX410                        MM/DD/YY HH:MM
Active Alarms: CRITICAL MAJOR                        ID:             MX410


                          Frame Relay 1 Type : User


                               1 - None
                               2 - Network (DCE)
                               3 - User (DTE)
                               4 - Both (NNI)










  Selection :                                      '?' - System Help Screen
```

Figure 5-30. Frame Relay Type Menu

The Frame Relay Type menu options are listed in Table 5-20.

Table 5-20. Frame Relay Type Menu Options

Option	Description	Function
1	None	The frame relay type is not configured.
2	Network (DCE)	The frame relay interface is configured as the network or DCE.
3	User (DTE)	The frame relay interface is configured as the user or DCE.
4	Both (NNI)	The frame relay interface is configured as both network and user.

View Frame Relay Menu

The View Frame Relay menu, shown in Figure 5-31, is used to select a VC for viewing and provisioning.

```
                                      MX410                             MM/DD/YY HH:MM
Active Alarms: CRITICAL MAJOR                                   ID:              MX410


                             View Frame Relay 1 VC


                                1 - VC 1
                                2 - VC 2
                                3 - VC 3
                                4 - VC 4











  Selection :                                                 '?' - System Help Screen
```

Figure 5-31. View Frame Relay Menu

The View Frame Relay menu options are listed in Table 5-21.

Table 5-21. View Frame Relay Menu Options

Option	Description	Function
1–4	VC 1–4	This option displays the “Frame Relay Port Menu” on page 5-44.

Frame Relay Port Menu

The Frame Relay Port menu, shown in Figure 5-32, is used to provision the selected VC.

```
                                    MX410                         MM/DD/YY HH:MM
Active Alarms: CRITICAL MAJOR                           ID:                MX410


                      Frame Relay Port 1 VC 1 : Active


                     1 - Frame Relay DLCI           : 16
                     2 - IP Address                 : 10.10.10.1
                         Subnet Mask                : 255.255.255.0
                     3 - Frame Relay MTU            : 1500










  Selection :                                          '?' - System Help Screen
```

Figure 5-32. Frame Relay Port Menu

The Frame Relay Port menu options are listed in Table 5-22.

Table 5-22. Frame Relay Port Menu Options

Option	Description	Function
1	Frame Relay DLCI	This option is used to set the DLCI of the selected VC to 16 to 992. The default settings are as follows: • DLCI for VC 1 is 16. • DLCI for VC 2 is 17. • DLCI for VC 3 is 18. • DLCI for VC 4 is 19.
2	IP Address	This option is used to configure the IP Address and Subnet Mask for the selected VC.
	Subnet Mask	This field displays the subnet mask.
3	Frame Relay MTU	This option is used to set the frame relay MTU size. The options are as follows: • 1500 • 1520

Network Mode Menu

The Network Mode menu, shown in Figure 5-33, is used to provision the network mode.

NOTE

Changing the IP routing mode changes the BCP/IPCP setting for the PPP links.

```
                                     MX410                            MM/DD/YY HH:MM
Active Alarms: CRITICAL MAJOR                              ID:                 MX410


                                 Network Mode


                     1 - IP Routing                 : Disabled
                     2 - RIP                        : Disabled
                     3 - OSPF                       : Disabled











  Selection :                                          '?' - System Help Screen
```

Figure 5-33. Network Mode Menu

The Network Mode menu options are listed in Table 5-23.

Table 5-23. Network Mode Menu Options

Option	Description	Function
1	IP Routing	This option is used to enable or disable IP routing using either RIP, OSPF, or both if enabled.
2	RIP	This option displays the "RIP Provisioning Menu" on page 5-46.
3	OSPF	This option displays the "OSPF Network Menu" on page 5-48.

RIP Provisioning Menu

The RIP Provisioning menu, shown in Figure 5-34, is used to provision the RIP routing protocol and the RIP version.

```
                                     MX410                            MM/DD/YY HH:MM
Active Alarms: CRITICAL MAJOR                          ID:                     MX410


                              RIP Provisioning


                    1 - State                      : Enabled
                    2 - Version                    : Version 2










  Selection :                                        '?' - System Help Screen
```

Figure 5-34. RIP Provisioning Menu

The RIP Provisioning menu options are listed in Table 5-24.

Table 5-24. RIP Provisioning Menu Options

Option	Description	Function
1	State	This option is used to set the RIP routing protocol state. Possible states are as follows: • Enabled • Disabled
2	Version	This option is used to set the RIP version. Options are as follows: • Version 1 • Version 2

OSPF Provisioning Menu

The OSPF Provisioning menu, shown in Figure 5-35, is used to provision the OSPF.

```
                              MX410                         MM/DD/YY HH:MM
Active Alarms: CRITICAL MAJOR                       ID:               MX410


                        OSPF Provisioning


                1 - State                       : Enabled
                2 - Network Address             : 0.0.0.0
                    Wildcard                    : 255.255.255.255
                    Area                        : 0










  Selection :                                      '?' - System Help Screen
```

Figure 5-35. OSPF Provisioning Menu

The OSPF Provisioning menu options are listed in Table 5-25.

Table 5-25. OSPF Provisioning Menu Options

Option	Description	Function
1	State	This option is used to set the OSPF routing protocol state. Possible states are as follows: • Enabled • Disabled
2	Network Address	This option displays the "OSPF Network Menu" on page 5-48.
	Wildcard	This field displays the OSPF wildcard for the given network address.
	Area	This field displays the OSPF area for the given network address and wildcard.

OSPF Network Menu

The OSPF Network menu, shown in Figure 5-36, is used to set the network address, wildcard, and area.

```
                                  MX410                            MM/DD/YY HH:MM
Active Alarms: CRITICAL MAJOR                         ID:                   MX410


                              OSPF Network


                    1 - Address                    : 0.0.0.0
                    2 - Wildcard                   : 255.255.255.255
                    3 - Area                       : 0.0.0.0
                    4 - Apply Settings










  Selection :                                   '?' - System Help Screen
```

Figure 5-36. OSPF Network Menu

The OSPF Network menu options are listed in Table 5-26.

Table 5-26. OSPF Network Menu Options

Option	Description	Function
1	Address	This option is used to set the OSPF network address. The default OSPF network address is 0.0.0.0.
2	Wildcard	This option is used to set the OSPF wildcard associated with the given network address. The combination of the address and the wildcard defines the address range included in the OSPF routing table. The default OSPF wildcard is 255.255.255.255.
3	Area	This option is used to set the OSPF network area. The area can be provided as an integer value or as an IP address format. The default OSPF network area is zero.
4	Apply Settings	This option is used to apply the settings that are set from the OSPF Network menu.

SNMP Menu

The SNMP (Simple Network Management Protocol) menu (see Figure 5-37) is used to provision SNMP information.

```
                                     MX410                            MM/DD/YY HH:MM
Active Alarms: CRITICAL MAJOR MINOR                   ID:                      MX410


                                     SNMP


  1 - SNMP State       : Disabled
  2 - Trap Host 1 IP   : 0.0.0.0
  3 - Trap Host 2 IP   : 0.0.0.0
  4 - Trap Host 3 IP   : 0.0.0.0
  5 - Trap Host 4 IP   : 0.0.0.0
  6 - SNMP Traps       : Disabled
  7 - System Name      : MX410
  8 - System Location  :
  9 - System Contact   :
 10 - Read Community   : public
 11 - Write Community  : private



  Selection :                                       '?' - System Help Screen
```

Figure 5-37. SNMP Menu

The SNMP menu options are listed in Table 5-27.

Table 5-27. SNMP Menu Options

Option	Description	Function
1	SNMP State	This option sets the SNMP state to enabled or disabled. When disabled, the MX410/MX412 ignores all incoming SNMP packets, and does not transmit SNMP packets.
2	Trap Host 1 IP	This option invokes another menu which is used to enter the Trap Host 1 IP address of an SNMP manager to which the MX410/MX412 sends traps, the method (version 1 traps or version 2 notifications), and enable or disable the trap host.
3	Trap Host 2 IP	This option invokes another menu which is used to enter the Trap Host 2 IP address of an SNMP manager to which the MX410/MX412 sends traps, the method (version 1 traps or version 2 notifications), and enable or disable the trap host.
4	Trap Host 3 IP	This option invokes another menu which is used to enter the Trap Host 3 IP address of an SNMP manager to which the MX410/MX412 sends traps, the method (version 1 traps or version 2 notifications), and enable or disable the trap host.

Table 5-27. SNMP Menu Options (Continued)

Option	Description	Function
5	Trap Host 4 IP	This option invokes another menu which is used to enter the Trap Host 4 IP address of an SNMP manager to which the MX410/MX412 sends traps, the method (version 1 traps or version 2 notifications), and enable or disable the trap host.
6	SNMP Traps	This option displays the user-defined system name and invokes another menu which is used to input alphanumeric characters that identify the name of the MX410/MX412.
7	System Name	This option displays the user-defined system name and invokes another menu which is used to input alphanumeric characters that identify the name of the MX410/MX412.
8	System Location	This option displays the user-defined system location and invokes another menu which is used to input alphanumeric characters that identify the physical location of the MX410/ MX412.
9	System Contact	This option displays the user-defined system contact and invokes another menu which is used to input the name of personnel to contact about the MX410/MX412.
10	Read Community	This option invokes another menu which is used to enter the authentication strings used for SNMP management. Input a value that matches the MX410/MX412 to the SNMP manager for read privileges.
11	Write Community	This option invokes another menu which is used to enter the authentication strings used for SNMP management. Input a value that matches the MX410/MX412 to the SNMP manager for write privileges.

SCA Update Menu

The SCA (System Configuration Archive) Update menu (see Figure 5-38) is used to update SCA information.

```
                              MX410                          MM/DD/YY HH:MM
Active Alarms: CRITICAL MAJOR                       ID:                MX410


                           SCA Update


                  1 - SCA TFTP Server      : 0.0.0.0
                  2 - Remote Filename      :
                  3 - All/Data Path Only   : All Provisioning
                  4 - Perform SCA Save
                  5 - Perform SCA Restore

                  6 - Auto Save Time       : Wed 10:35
                  7 - Auto Save            : Disabled


                  Awaiting download.




  Selection :                                    '?' - System Help Screen
```

Figure 5-38. SCA Update Menu

The SCA Update menu options are listed in Table 5-28.

Table 5-28. SCA Update Menu Options

Option	Description	Function
1	SCA TFTP Server	This option is used to enter the IP address where the SCA server resides.
2	Remote Filename	This option is used to enter the name of a file to save to or restore from the SCA server.
3	All/Data Path Only	This option is used to select the amount of data to save to the SCA server.
4	Perform SCA Save	This option is used to initiate an upload to save provisioning.
5	Perform SCA Restore	This option is used to initiate a download to restore provisioning.
6	Auto Save Time	This option is used to enter the date and time to automatically perform an auto save.
7	Auto Save	This option is used to automatically save SCA provisioning data at a user-specified date and time by selecting enabled or disabled.

Quick Setup Menu

The Quick Setup menu (see Figure 5-39) is used to simplify the installation process. All of the basic configuration options necessary to setup the MX410/MX412 are grouped together. The Quick Setup menu allows configuration of such items as DS0 drop assignments, as well as system date, time, and IP Address information.

```
                                     MX410                            MM/DD/YY HH:MM
Unacknowledged Alarms: CRITICAL                         ID:                    MX410


                                  Quick Setup
 Ports
  1 - PPPs                              9 - Frame Relay
      PPP 1  =



  2 - V.35  =

 System
  3 - System ID
  4 - IP Address          : 192.168.100.1
      Subnet Mask         : 255.255.0.0
  5 - Default Gateway     : 192.168.1.1
  6 - Date
  7 - Time                              8 - Cross-Connect Mapping


  Selection :                                        '?' - System Help Screen
```

Figure 5-39. Quick Setup Menu

The Quick Setup menu options are listed in Table 5-29.

Table 5-29. Quick Setup Menu Options

Option	Description	Function
1	PPPs	This option is used to provision the PPP ports. Options are as follows: • Choose FROM PPP (for PPP 1 through PPP 4) • Choose TO Group (for DS1 1 through DS1 4) • Choose TO DS0 Range (enter a range of DS0s) • Apply Cross-Connect
2	V.35	This option is used to provision the V.35 port. Options are as follows: • Choose TO Group (for DS1 1 through DS1 4) • Choose TO DS0 Range (enter a range of DS0s) • Apply Cross-Connect

Table 5-29. Quick Setup Menu Options (Continued)

Option	Description	Function
3	FXS (MX412 only)	This option is used to provision the FXS port. Options are as follows: • Choose TO Group (for DS1 1 through DS1 4) • Choose TO DS0 Range: enter a range • Mode: Select Loop Start, PLAR D4, PLAR D3, or FX Ringdown. Refer to Table 4-6 on page 4-9 for descriptions of these options. • Apply Cross-Connect
3	System ID	This option is used to assign a new system ID.
4	IP Address	This option is used to enter the IP Address for the MX410/ MX412. The IP Address is written in the format XXX.XXX.XXX.XXX, where each 3-digit field has a value between 1 and 255.
N/A	Subnet Mask	This option is used to enter the subnet mask, written in the format XXX.XXX.XXX.XXX, where each 3-digit field has a value between 1 and 255.
5	Default Gateway	This option is used to enter the default gateway. The Gateway address is written in the format XXX.XXX.XXX.XXX, where each 3-digit field has a value between 1 and 255.
6	Date	This option is used to enter the date.
7	Time	This option is used to enter the time.
8	Cross-Connect Mapping	This is another path to the Cross-Connect Mapping menu, shown in Figure 5-20 on page 5-27, and contains the same options.
9	Frame Relay	This option is used to provision the frame relay cross-connect. Options are as follows: • Choose FROM Port (for FR1–FR4) • Choose TO Group (for DS1 1–DS1 4) • Choose TO DS0 Range (enter range of DS0s) • Apply Cross-Connect

Status Screens

The Status screens (see Figure 5-40, Figure 5-41, and Figure 5-42) provides detailed status information about the DS1 Ports, Ethernet Ports, PPP, Timing, Power Feed, and Frame Relay. Use the T to toggle through the screens. The MX410 has two status screens and the MX412 has three.

```
                                         MX412                           MM/DD/YY HH:MM
Active Alarms: CRITICAL MAJOR                                   ID:                MX412

                                        Status

 DS1 Ports                                      PPP Interfaces
      State    Line Status RxdB Test                 State      LCP    BCP    IPCP
  1 - Enabled  LOS,TX RAI   -15 Data mode   1 - Disabled   DOWN   DOWN   DOWN
  2 - Enabled  LOS,TX RAI   -15 Data mode   2 - Disabled   DOWN   DOWN   DOWN
  3 - Enabled  LOS,TX RAI   -15 Data mode   3 - Disabled   DOWN   DOWN   DOWN
  4 - Enabled  LOS,TX RAI   -15 Data mode   4 - Disabled   DOWN   DOWN   DOWN
  5 - Enabled  LOS,TX RAI   -15 Data mode
  6 - Enabled  LOS,TX RAI   -15 Data mode
  7 - Enabled  LOS,TX RAI   -15 Data mode
  8 - Enabled  LOS,TX RAI   -15 Data mode   FXS
  9 - Enabled  LOS,TX RAI   -15 Data mode    Mode          Status
 10 - Enabled  LOS,TX RAI   -15 Data mode    D4 Loop Start  N/A
 11 - Enabled  LOS,TX RAI   -15 Data mode
 12 - Enabled  LOS,TX RAI   -15 Data mode



  <T>oggle Screen
```

Figure 5-40. DS1, PPP, and FXS Status Screen

```
                                         MX412                           MM/DD/YY HH:MM
Active Alarms: CRITICAL MAJOR                                   ID:                MX412

                                        Status

 Ethernet Ports                                 Auxiliary Alarms
      Status     Speed                               Status     Severity
 1 - Up          100 Mbps, Full Duplex          1 - Cleared    N/A
 2 - Down        Unknown                        2 - Cleared    N/A
 3 - Down        Unknown                        3 - Cleared    N/A
 4 - Down        Unknown                        4 - Cleared    N/A

 Timing Source                                  Power Feed
             Status      Source                     Status
 Primary   - Failed      DS1 1                  A - Failed
 Secondary - Failed      DS1 3                  B - Normal






  <T>oggle Screen
```

Figure 5-41. Ethernet, Alarms, Timing, and Power Status Screen

```
                                      MX412                             MM/DD/YY HH:MM
Active Alarms: CRITICAL MAJOR                                  ID:                MX412

                                     Status


 Frame Relay
 Port 1 : Enabled : Up                       Port 3 : Disabled : Down
   VC 1 - Active DLCI   = 16                   VC 1 - Inactive DLCI = 16
   VC 2 - Inactive DLCI = 17                   VC 2 - Inactive DLCI = 17
   VC 3 - Inactive DLCI = 18                   VC 3 - Inactive DLCI = 18
   VC 4 - Inactive DLCI = 19                   VC 4 - Inactive DLCI = 19

 Port 2 : Disabled : Down                    Port 4 : Disabled : Down
   VC 1 - Inactive DLCI = 16                   VC 1 - Inactive DLCI = 16
   VC 2 - Inactive DLCI = 17                   VC 2 - Inactive DLCI = 17
   VC 3 - Inactive DLCI = 18                   VC 3 - Inactive DLCI = 18
   VC 4 - Inactive DLCI = 19                   VC 4 - Inactive DLCI = 19




  <T>oggle Screen
```

Figure 5-42. Frame Relay Status Screen

The Status menu options are listed in Table 5-30.

Table 5-30. Status Screen Fields

Option	Description	Function
DS1 Ports		
1-12	State	This field displays the current state of the DS1 Ports as either Enabled or Disabled.
N/A	Line Status	This field displays the current line status of the four DS1 ports (12 ports on the MX412). The possible states are as follows: • LOS: Loss of Signal • LOF: Loss of Frame (RX Red Alarm) • RX AIS: Receiving Alarm Indication Signal (RX Blue Alarm) • TX AIS: Transmitting Alarm Indication Signal (TX Blue Alarm) • RX RAI: Receiving Remote Alarm Indicator (RX Yellow Alarm) • TX RAI: Transmitting Remote Alarm Indicator (TX Yellow Alarm) • Normal: Indicates no alarms currently active
N/A	RxdB	This field displays the receive level of the incoming T1 signal.
N/A	Test	This field displays one of the following possible states: • Data Mode: Indicates no tests are active • Payload Loopback: Indicates that a payload loopback is in progress • Line Loopback: Indicates that a line loopback is in progress

Table 5-30. Status Screen Fields (Continued)

Option	Description	Function
PPP Interfaces		
1-4	State	This field displays the current state of the four PPP interfaces as either Enabled or Disabled.
N/A	LCP	This field displays the active state of this control protocol as either Up or Down.
N/A	BCP	This field Displays the active state of this control protocol as either Up or Down.
N/A	IPCP	This field Displays the active state of this control protocol as either Up or Down.
Ethernet Ports		
1-4	Status	This field displays the current status as either Up or Down.
N/A	Speed	This field Displays one of the following speeds as active: • 10 Mbps, Half Duplex • 10 Mbps, Full Duplex • 100 Mbps, Half Duplex • 100 Mbps, Full Duplex
Auxiliary Alarms		
1-4	Status	This field displays the current alarm status as either Active or Cleared.
N/A	Severity	This field displays the current alarm severity. Severities are defined by the customer and displayed as Critical, Major, Minor, Alert, or Info.
Power Feed		
A/B	Status	This field displays the power feed (which connects to the rear of the MX410/MX412) as either Normal or Failed.
PSU (MX410 Only)		
A/B	State	This field displays the current status of the A/B PSUs as either Installed or Removed.
N/A	Status	This field displays the current status of the A/B PSUs as Normal, Failed (if the PSU is installed), or N/A (if the PSU is not installed).
Timing Source		
Primary/ Secondary	Status	This field displays the status as either Active, Standby, or Failed.
N/A	Source	This field Displays internal or DS1 (1-4 on MX410 or 1-12 on MX412).

Table 5-30. Status Screen Fields (Continued)

Option	Description	Function
Frame Relay		
Port 1–4	State	This field displays the state as either enabled or disabled.
Port 1–4	Status	This field displays the port status as either up or down.
VC 1–4	Status	This field displays the VC status as one of the following states: • Inactive - VC is not communicating with the port. • Active - VC is communicating with the port.

Test Menu

The Test menu (see Figure 5-43) provides options for testing the DS1 Ports.

```
                                     MX410                            MM/DD/YY HH:MM
Active Alarms: CRITICAL MAJOR                              ID:                 MX410


                                     Test

                                   DS1 Ports

                              1 - #1 : Pattern
                              2 - #2 : Data mode
                              3 - #3 : Data mode
                              4 - #4 : Data mode

                              5 - Reset ALL Tests
                              6 - Loopback Timeout:   120 Minutes







  Selection :                                            '?' - System Help Screen
```

Figure 5-43. Test Menu

The Test menu options are listed in Table 5-31.

Table 5-31. Test Menu Options

Option	Description	Function
1-4 (1-12)	1-4 (1-12 for MX412)	This option is used to invokes the "DS1 (Port #) Menu" on page 5-59.
5 (13)	Reset ALL Tests	This option is used to stop all DS1 port testing and resets all DS1 ports to Data Mode.
6 (14)	Loopback Timeout	This option is used to set the loopback timeout value. The default value is 120 Minutes and the possible values are as follows: • 120 Minutes • 90 Minutes • 60 Minutes • 30 Minutes • 15 Minutes • 10 Minutes • 5 Minutes • Disabled

Note: The numbers in parenthesis "()" in the Option column denote the option numbers for the MX412 system.

DS1 (Port #) Menu

The DS1 (Port #) menu (see Figure 5-44) provides options for testing the DS1 Ports.

```
                                     MX410                           MM/DD/YY HH:MM
Active Alarms: CRITICAL MAJOR                                  ID:            MX410


                                     DS1 1


                              1 - Loopback            : Pattern

                                  Pattern             : Ones
                              2 - Insert One Bit Error
                              3 - Clear Bit Error Count
                                  Patt Sync           : NO SYNC
                                  Bit Errors          : 14

                                  DS1 1 Status        : LOS,TX RAI





  Selection:                                          '?' - System Help Screen
```

Figure 5-44. DS1 (Port #) Menu

The DS1 (Port #) menu options are listed in Table 5-32.

Table 5-32. DS1 (Port #) Menu Options

Option	Description	Function
1	Loopback	This option is used to display the current loopback. Selecting this option invokes the "Port (#) Test Menu" on page 5-60.
N/A	Pattern	This option is used to display the current pattern type.
2	Insert One Bit Error	This option is present only when a pattern has been selected and inserts one bit error count.
3	Clear Bit Error Count	This option is present only when a pattern has been selected and clears one bit error count.
N/A	Patt Sync	This read-only field displays the pattern synchronization status.
N/A	Bit Errors	This read-only field displays the current number of bit errors.
N/A	DS1 (#) Status	This read-only field displays the current status of the selected port.

Port (#) Test Menu

The Port (#) Test menu (see Figure 5-45) provides options for testing the DS1 Ports.

```
                                   MX410                          MM/DD/YY HH:MM
Active Alarms: CRITICAL MAJOR                             ID:              MX410


                           Port #1 : Pattern


                              1 - Data Mode
                              2 - Payload
                              3 - Line
                              4 - Inward
                              5 - Dual
                              6 - Remote FDL Line
                              7 - Remote Inband Line (CSU)
                              8 - Remote FDL Payload
                              9 - Pattern Test







  Selection:                                           '?' - System Help Screen
```

Figure 5-45. Port (#) Test Menu

The Port (#1-#4 on MX410, and #1-#12 on MX412) Test menu options are listed in Table 5-33.

Table 5-33. Port (#) Test Menu Options

Option	Description	Function
1	Data Mode	This option indicates that no tests are active.
2	Payload	This option initiates a payload loopback test.
3	Line	This option initiates a line loopback test.
4	Inward	This option initiates an inward loopback test.
5	Dual	This option initiates both line and inward loopback tests.
6	Remote FDL Line	This option transmits a request through the FDL (Facility Data Link) for the remote unit to issue a line loopback (ESF only).
7	Remote Inband Line (CSU)	This option transmits an inband request for the remote unit to issue a line loopback.
8	Remote FDL Payload	This option transmits a request through the FDL for the remote unit to issue a payload loopback (ESF only).
9	Pattern Test	This option invokes the DS1 Test Pattern menu.

DS1 Test Pattern Menu

The DS1 Test Pattern menu (see Figure 5-46) provides options for testing the DS1 ports using pattern data.

```
                                 MX410                        MM/DD/YY HH:MM
Active Alarms: CRITICAL MAJOR                          ID:              MX410


                              DS1 1 Test Pattern

                                1 - QRSS
                                2 - All Ones
                                3 - All Zeros
                                4 - 511
                                5 - 2047
                                6 - 2^15-1
                                7 - 2^20-1









  Selection :                                        '?' - System Help Screen
```

Figure 5-46. DS1 Test Pattern Menu

The DS1 Test Pattern menu options are all test pattern types. Selecting any of the options invokes a warning menu that test patterns are service affecting and requests execution verification.

Pattern type options are as follows:

- QRSS
- All Ones
- All Zeros
- 511
- 2047
- 2^15-1
- 2^20-1

Performance Monitoring Menu

The Performance Monitoring menu (see Figure 5-47) provides options for viewing performance data affecting the MX410/MX412 operations. Data is viewed in daily or 15-minute increments.

```
                                     MX410                          MM/DD/YY HH:MM
Active Alarms: CRITICAL MAJOR                             ID:                MX410


                            Performance Monitoring

                             1 - Daily PM Table
                             2 - Quarter Hour PM Table
                             3 - Daily PM Thresholds
                             4 - Quarter Hour PM Thresholds
                             5 - Clear All PM Data

                             6 - Upload PM Flat File




                                Selection :




                                                        '?' - System Help Screen
```

Figure 5-47. Performance Monitoring Menu

The Performance Monitoring menu options are listed in Table 5-34.

Table 5-34. Port (#) Test Menu Options

Option	Description	Function
1	Daily PM Table	This option invokes the "Daily Performance Monitoring Screen" on page 5-65.
2	Quarter Hour PM Table	This option invokes the "Quarter Hour Performance Monitoring Screen" on page 5-65.
3	Daily PM Thresholds	This option invokes the "Daily PM Thresholds Menu" on page 5-66.
4	Quarter Hour PM Thresholds	This option invokes the "Quarter Hour PM Thresholds Menu" on page 5-68.
5	Clear All PM Data	This option invokes the "Clear PM Data Menu" on page 5-69.
6	Upload PM Flat File	This option invokes the "Upload PM Flat File Menu" on page 5-70.

Performance Monitoring Definitions are listed in Table 5-35.

Table 5-35. Performance Monitoring Definitions

T1 PM Parameter	Definition	Description
CV-L	Code Violation - Line	This parameter indicates the number of Bipolar Violations (BPVs) and Excessive Zeros (EXZs) that have occurred during the accumulation period.
ES-L	Errored Seconds - Line	This parameter indicates the number of seconds for which one or more Line Coding Violations (CV-Ls), or one or more Loss of Signal (LOS) defects occurred.
SES-L	Severely Errored Seconds - Line	This parameter indicates the number of seconds with 1544 or more CV-Ls or one or more LOS defects.
LOSS-L	Loss of Signal Second - Line	This parameter indicates the number of seconds for which one or more LOS defects occurred.
CV-P	Code Violation - Path	SF Mode: This parameter indicates the number of frame synchronization bit errors that have occurred during the accumulation period. ESF Mode: This parameter indicates the number of CRC-6 errors that have occurred during the accumulation period.
ES-P	Errored Seconds - Path	SF Mode: This parameter indicates the number of seconds containing any of the following: • FE errors [1] • CS events [2] • SEF defects [3] • AIS defects [4] ESF Mode: This parameter indicates the number of seconds containing any of the following: • CRC-6 errors [5] • CS events • SEF defects • AIS defects
SES-P	Severely Errored Seconds - Path	SF Mode: This parameter indicates the number of seconds with 8 or more FE events or one or more SEF or AIS defects. ESF Mode: This parameter indicates the number of seconds with 320 or more CRC-6 errors or one or more SEF or AIS defects.
SAS-P	Severely Errored Frame/AIS Second - Path	This parameter indicates the number of seconds containing one or more SEF defects or one or more AIS defects.
UAS-P	Unavailable Second - Path	This parameter indicates the number of seconds for which the DS1 path contains 10 contiguous SESs.
CSS-P	Controlled Slip Second - Path	This parameter indicates the number of seconds containing one or more controlled frame slips.

1. FE (Frame bit Error): This parameter indicates the occurrence of a frame bit error in the received frame bit pattern.
2. CS (Controlled Slip): This parameter indicates the replication or deletion of the 192 payload bits of a DS1 frame by the receiving unit.
3. SEF (Severely Errored Frame): This parameter indicates that two or more frame bit errors are detected in a window.
4. AIS (Alarm Indication Signal): This parameter indicates the detection of an unframed signal with a 1s density of at least 99.9% for a time.
5. CRC-6 (Cyclic Redundancy Check) Error - used in ESF mode only: This parameter indicates the existence of a CRC-6 code that is not identical to the corresponding locally calculated code.

The hot keys used in the Performance Monitoring submenus are listed in Table 5-36.

Table 5-36. Performance Monitoring Menu Hot Keys

Hot Key or Terminology	Description
* = Invalid Interval	An asterisk indicates that the interval is off by plus or minus ten seconds.
(N)ext DS1	This hot key displays the performance monitoring statistics for the next DS1 port.
(P)revious DS1	This hot key displays the performance monitoring statistics for the previous DS1 port.
(E)nter DS1	This hot key displays the performance monitoring statistics for the entered DS1 port number.
(F)orward	This hot key displays the next page of statistics for the selected DS1 port.
(B)ack	This hot key displays the previous page of statistics for the selected DS1 port.
(C)lear	This hot key clears all performance monitoring statistics for the selected DS1 port.
(A)dd 24 hours	This hot key adds 24 hours to the current display of quarter hour performance monitoring.
(S)ub 24 hours	This hot key subtracts 24 hours to the current display of quarter hour performance monitoring.

Daily Performance Monitoring Screen

The Daily Performance Monitoring screen (see Figure 5-48) displays DS1 performance monitoring data in daily increments and in a tabular format.

```
                                     MX410                           MM/DD/YY HH:MM
Active Alarms: CRITICAL MAJOR                            ID:                  MX410


                   DS1 Port 1 Daily Performance Monitoring


        Current       Total   06/22   06/21     N/A     N/A     N/A     N/A
CV-L          0           0       0       0       0       0       0       0
ES-L      52549      134621   86374   48247       0       0       0       0
SES-L     52549      134621   86374   48247       0       0       0       0
LOSS-L    52549      134621   86374   48247       0       0       0       0
CV-P          0           0       0       0       0       0       0       0
ES-P          0           0       0       0       0       0       0       0
SES-P         0           0       0       0       0       0       0       0
SAS-P         0           0       0       0       0       0       0       0
UAS-P     52549      134621   86374   48247       0       0       0       0
CSS-P         0           0       0       0       0       0       0       0


       * = Invalid Interval

       (N)ext DS1, (P)rev DS1, (E)nter DS1, (F)orward, (B)ack, (C)lear
```

Figure 5-48. Daily Performance Monitoring Screen

Quarter Hour Performance Monitoring Screen

The Quarter Hour Performance Monitoring screen (see Figure 5-49) displays DS1 performance monitoring data in 15-minute increments and in a tabular format.

```
                                     MX410                           MM/DD/YY HH:MM
Active Alarms: CRITICAL MAJOR                            ID:                  MX410


               DS1 Port 1 Quarter Hour Performance Monitoring

                              09/28   09/28   09/28   09/28   09/28   09/28
        Current       Total   15:15   15:00   14:45   14:30   14:15   14:00
CV-L          0           0       0       0       0       0       0       0
ES-L        556       86366     900     900     900     900     900     900
SES-L       556       86366     900     900     900     900     900     900
LOSS-L      556       86366     900     900     900     900     900     900
CV-P          0           0       0       0       0       0       0       0
ES-P          0           0       0       0       0       0       0       0
SES-P         0           0       0       0       0       0       0       0
SAS-P         0           0       0       0       0       0       0       0
UAS-P       556       86366     900     900     900     900     900     900
CSS-P         0           0       0       0       0       0       0       0

       * = Invalid Interval

       (N)ext DS1, (P)rev DS1, (E)nter DS1, (F)orward, (B)ack, (C)lear
                        (A)dd 24 Hours, (S)ub 24 Hours
```

Figure 5-49. Quarter Hour Performance Monitoring Screen

Daily PM Thresholds Menu

The Daily PM Thresholds menu (see Figure 5-50) displays DS1 performance monitoring thresholds data in a tabular format. This menu is used to set the performance monitoring threshold levels and enable or disable an alarm if the threshold is exceeded.

```
                                     MX410                          MM/DD/YY HH:MM
Active Alarms: CRITICAL MAJOR                                  ID:            MX410


                              Daily PM Thresholds

                                          Threshold          Alarm
                   1 - ES-L              :      648        Enabled
                   2 - CV-P (ESF mode)   :   132960        Enabled
                   3 - CV-P (SF mode)    :      691        Enabled
                   4 - ES-P              :      648        Enabled
                   5 - SES-P             :      100        Enabled
                   6 - SAS-P             :       17        Enabled
                   7 - CSS-P             :        4        Enabled
                   8 - UAS-P             :       10        Enabled

                   9 - Restore ALL DS1 Threshold Defaults
                  10 - Enable ALL DS1 Threshold Alarms
                  11 - Disable ALL DS1 Threshold Alarms




  Selection :                                          '?' - System Help Screen
```

Figure 5-50. Daily PM Thresholds Menu

The Daily PM Thresholds menu options are listed in Table 5-37.

Table 5-37. Daily PM Thresholds Menu Options

Option	Description	Function
1	ES-L	This option sets the ES-L threshold value. The available threshold range is (1-65535). The default value is 648.
2	CV-P (ESF mode)	This option sets the CV-P ESF threshold value. The available threshold range is (1-1048575). The default value is 132,960.
3	CV-P (SF mode)	This option sets the CV-P SF threshold value. The available threshold range is (1-1048575). The default value is 691.
4	ES-P	This option sets the ES-P threshold value. The available threshold range is (1-65535). The default value is 648.
5	SES-P	This option sets the SES-P threshold value. The available threshold range is (1-65535). The default value is 100.
6	SAS-P	This option sets the SAS-P threshold value. The available threshold range is (1-65535). The default value is 17.
7	CSS-P	This option sets the CSS-P threshold value. The available threshold range is (1-65535). The default value is 691.

Table 5-37. Daily PM Thresholds Menu Options (Continued)

Option	Description	Function
8	UAS-P	This option sets the UAS-P threshold value. The available threshold range is (1-65535). The default value is 10.
9	Restore ALL DS1 Threshold Defaults	This option restores all threshold values to the defaults listed above.
10	Enable ALL DS1 Threshold Alarms	This option enables all daily threshold alarms.
11	Disable ALL DS1 Threshold Alarms	This option disables all daily threshold alarms.

Quarter Hour PM Thresholds Menu

The Quarter Hour PM Thresholds menu (see Figure 5-51) displays DS1 performance monitoring thresholds data in a tabular format. This menu is used to set the performance monitoring threshold levels and enable or disable alarms if the thresholds are exceeded.

```
                                      MX410                             MM/DD/YY HH:MM
Active Alarms: CRITICAL MAJOR                               ID:                  MX410


                          Quarter Hour PM Thresholds

                                         Threshold           Alarm
                   1 - ES-L               :        65         Enabled
                   2 - CV-P (ESF mode)    :     13296         Enabled
                   3 - CV-P (SF mode)     :        72         Enabled
                   4 - ES-P               :        65         Enabled
                   5 - SES-P              :        10         Enabled
                   6 - SAS-P              :         2         Enabled
                   7 - CSS-P              :         1         Enabled
                   8 - UAS-P              :        10         Enabled

                   9 - Restore ALL DS1 Threshold Defaults
                  10 - Enable ALL DS1 Threshold Alarms
                  11 - Disable ALL DS1 Threshold Alarms



  Selection :                                             '?' - System Help Screen
```

Figure 5-51. Quarter Hour PM Thresholds Menu

The Quarter Hour PM Thresholds menu options are listed in Table 5-38.

Table 5-38. Quarter Hour PM Thresholds Menu Options

Option	Description	Function
1	ES-L	This option sets the ES-L threshold value. The available threshold range is (1-900). The default value is 65.
2	CV-P (ESF mode)	This option sets the CV-P ESF threshold value. The available threshold range is (1-16383). The default value is 13,296.
3	CV-P (SF mode)	This option sets the CV-P SF threshold value. The available threshold range is (1-16383). The default value is 72.
4	ES-P	This option sets the ES-P threshold value. The available threshold range is (1-900). The default value is 65.
5	SES-P	This option sets the SES-P threshold value. The available threshold range is (1-900). The default value is 10.
6	SAS-P	This option sets the SAS-P threshold value. The available threshold range is (1-900). The default value is 2.
7	CSS-P	This option sets the CSS-P threshold value. The available threshold range is (1-900). The default value is 72.

Table 5-38. Quarter Hour PM Thresholds Menu Options (Continued)

Option	Description	Function
8	UAS-P	This option sets the UAS-P threshold value. The available threshold range is (1-900). The default value is 10.
9	Restore ALL DS1 Threshold Defaults	This option restores all threshold values to the defaults listed above.
10	Enable ALL DS1 Threshold Alarms	This option enables all quarter hour threshold alarms.
11	Disable ALL DS1 Threshold Alarms	This option disables all quarter hour threshold alarms.

Clear PM Data Menu

This option invokes the Clear Performance Monitoring Data menu and requests verification before deleting all previously collected performance monitoring data.

Upload PM Flat File Menu

The Upload PM Flat File menu (see Figure 5-52) provides options for uploading the performance monitoring flat file.

NOTE

The comma delimited format of the flat file allows for the PM data to be imported into a spreadsheet for analysis or graphical depiction (see Table 5-40 and Figure 5-53).

```
                                      MX410                            MM/DD/YY HH:MM
Active Alarms: CRITICAL MAJOR                                  ID:              MX410


                               Upload PM Flat File


                         1 - SCA TFTP Server     : 0.0.0.0
                         2 - Remote Filename     :


                         3 - TFTP PM Flat File


                         4 - Auto Save Time      : Fri 17:02
                         5 - Auto Save           : Disabled


                         Awaiting transfer.



  Selection :                                              '?' - System Help Screen
```

Figure 5-52. Upload PM Flat File Menu

The Upload PM Flat File menu options are listed in Table 5-39.

Table 5-39. Upload PM Flat File Menu Options

Option	Description	Function
1	SCA TFTP Server	This option is used to enter the IP address where the TFTP server resides.
2	Remote Filename	This option is used to enter the filename stored on the TFTP server.
3	TFTP PM Flat File	This option is used to start the transfer process.
4	Auto Save Time	This option sets the day and time for the auto save.
5	Auto Save	This option is used to enable or disable the auto save feature.

Table 5-40. Example Data from PM Flat File

15-MIN			CV-L	ES-L	SES-L	LOSS-L	CV-P	ES-P	SES-P	SAS-P	UAS-P	CSS-P	MIN LVL (dB)	MAX LVL (dB)
Ifld	Timestamp	interval												
1	01/16 12:30	1	0	0	0	0	0	2	0	0	0	2	-12	-7
1	01/16 12:15	2	0	0	0	0	0	1	0	0	0	1	-12	-12
1	01/16 12:00	3	2	1	0	0	0	3	1	1	0	2	-12	0
1	01/16 11:45	4	0	0	0	0	0	1	0	0	0	1	0	0
1	01/16 11:30	5	0	0	0	0	0	1	0	0	0	1	-6	0
. . .	. . .	. . .												
1		672	0	0	0	0	0	0	0	0	0	0		
2	01/16 12:30	1	0	76	76	76	0	0	0	76	76	0	-15	-15
2	01/16 12:15	2	0	58	58	58	0	0	0	58	58	0	-15	-15
2	01/16 12:00	3	0	80	80	80	0	0	0	80	80	0	-15	-15
2	01/16 11:45	4	0	47	47	47	0	0	0	47	47	0	-15	-15
2	01/16 11:30	5	0	44	44	44	0	0	0	44	44	0	-15	-15
. . .	. . .	. . .												

Table 5-40. Example Data from PM Flat File (Continued)

15-MIN			CV-L	ES-L	SES-L	LOSS-L	CV-P	ES-P	SES-P	SAS-P	UAS-P	CSS-P	MIN LVL (dB)	MAX LVL (dB)
Ifld	Timestamp	interval												
2		672	0	0	0	0	0	0	0	0	0	0		
. . .	. . .	. . .												
12														

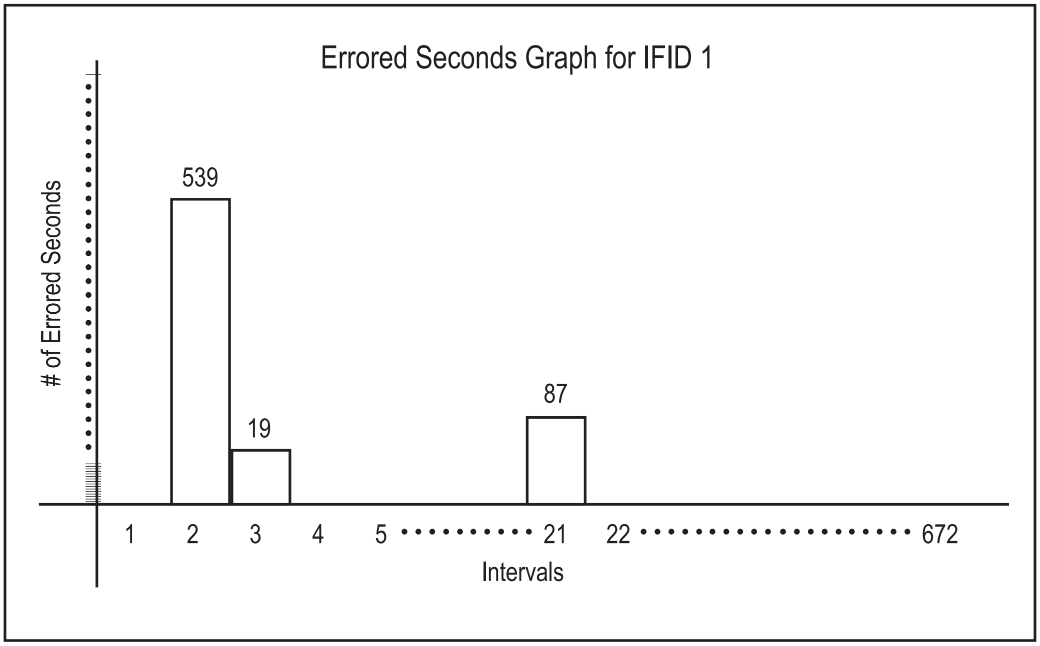


Figure 5-53. Example of Graphical Analysis of Data from PM Flat File

System Alarms Menu

The System Alarms menu (see Figure 5-54) provides options for viewing all alarms affecting MX410/MX412 system operations. Alarms may be viewed within the Master Log menu (detailed in the next section). The Environmental Alarms menu contains provisionable options. The Alarm Chronology menu offers the viewing of alarms in either ascending or descending order.

```
                                      MX410                             MM/DD/YY HH:MM
Active Alarms: CRITICAL                                        ID:               MX410


                                  System Alarms

                              1 - Master Log

                              2 - Environmental Alarms
                              3 - Alarm Chronology : Ascending













  Selection :                                                '?' - System Help Screen
```

Figure 5-54. System Alarms Menu

Master Log Menu

The Master Log menu (see Figure 5-55) is used to review and acknowledge alarms.

```
                                    MX410                              MM/DD/YY HH:MM
Active Alarms: CRITICAL       MINOR                       ID:                  MX410

                                   Alarms                           1 to  14 of 279

Date      Time       Type       Port   Level     Description          Status
06/30/06  14:54:01   T1         2      CRITICAL  DS1 LOS              Active
06/30/06  14:54:01   T1         3      CRITICAL  DS1 LOS              Active
06/30/06  14:54:01   T1         4      CRITICAL  DS1 LOS              Active
06/30/06  14:54:02   ENV               MINOR     PSU B Removed        Active
06/30/06  14:54:02   ENV               MINOR     Power Feed B Bad     Active
06/30/06  20:56:01   T1         1      MINOR     DS1 RX RAI           *Active
06/30/06  20:56:12   T1         1      MINOR     DS1 RX RAI           *Cleared
06/30/06  20:56:18   T1         1      MINOR     DS1 RX RAI           *Active
06/30/06  20:56:28   T1         1      MINOR     DS1 RX RAI           *Cleared
06/30/06  20:56:33   SYSTIMING         CRITICAL  SRC A&B FAILED       *Active
06/30/06  20:56:33   T1         1      CRITICAL  DS1 LOF              *Active
06/30/06  20:56:43   SYSTIMING         CRITICAL  SRC A&B FAILED       *Cleared
06/30/06  20:56:43   SYSTIMING         MINOR     SRC B FAILED         *Active
06/30/06  20:56:44   T1         1      CRITICAL  DS1 LOF              *Cleared


Inverse = Active       * = Unacknowledged       Chronology = Ascending
(N)ext  (P)revious  (F)irst  (L)ast  (C)lear  (A)cknowledge
```

Figure 5-55. Master Log Menu

Terminology and hot keys at the bottom of the menu are explained in Table 5-41.

Table 5-41. Master Log Menu Terminology and Hot Keys

Hot Key or Terminology	Description
Inverse = Active	This screen text is used to show current active alarms with reverse video text.
* = Unacknowledged	This screen text is used to indicate that Unacknowledged alarms are displayed with an asterisk (*) in the STATUS column.
Chronology = Ascending	This screen text is used to show the current alarm chronology setting. The alarm chronological sequence can be set to display in ascending or descending order in the System Alarms menu.
(N)ext	This hot key indicates that pressing the N key displays the next screen of alarms when all alarms cannot be displayed on one screen.
(P)revious	This hot key indicates that pressing the P key displays the previous screen of alarms when all alarms cannot be displayed on one screen.
(F)irst	This hot key indicates that pressing the F key displays the first alarms in the current chronological sequence.

Table 5-41. Master Log Menu Terminology and Hot Keys (Continued)

Hot Key or Terminology	Description
(L)ast	This hot key indicates that pressing the L key displays the last alarms in the current chronological sequence.
(C)lear	This hot key indicates that pressing the C key clears all inactive alarms.
(A)cknowledge	This hot key indicates that pressing the A key acknowledges all unacknowledged alarms (which removes asterisks from the menu).

Code Download Method Menu

The Code Download Method menu (see Figure 5-56) provides options for upgrading the software of the MX410/MX412.

```
                                   MX410                        MM/DD/YY HH:MM
Active Alarms: CRITICAL                                  ID:             MX410


                           Code Download Method


                       1 - X-MODEM
                       2 - TFTP











  Selection :                                          '?' - System Help Screen
```

Figure 5-56. Code Download Method Menu

The Code Download Method menu options are listed in Table 5-42.

Table 5-42. Code Download Method Menu Options

Option	Description	Function
1	X-MODEM	This option invokes another menu to initiate an X-Modem transfer. Options are as follows: • Initiate Transfer: This option initiates the transfer. Once initiated use the VT100 terminal or VT100 emulation software to send the file to the MX410/MX412. • Card Reset: This option applies newly downloaded software to the MX410/MX412.
2	TFTP	This option invokes another menu to initiate a TFTP transfer. Options are as follows: • TFTP Server: This option is used to enter the IP address where the TFTP server resides. • Remote Filename: This option is used to enter the filename stored on the TFTP server. • Initiate Transfer: This option is used to start the transfer process. • Card Reset: This option applies newly downloaded software to the MX410/MX412.

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Appendix A
Warranty

WARRANTY AND CUSTOMER SERVICE

ADTRAN will replace or repair this product within the warranty period if it does not meet its published specifications or fails while in service. Warranty information can be found at www.adtran.com/warranty.

Refer to the following subsections for sales, support, Customer and Product Service (CAPS) requests, or further information.

ADTRAN Sales

Pricing/Availability:

800-827-0807

ADTRAN Technical Support

Pre-Sales Applications/Post-Sales Technical Assistance:

800-726-8663

Standard hours: Monday - Friday, 7 a.m. - 7 p.m. CST
Emergency hours: 7 days/week, 24 hours/day

ADTRAN Repair/CAPS

Return for Repair/Upgrade:

(256) 963-8722

Repair and Return Address

Contact CAPS prior to returning equipment to ADTRAN.

ADTRAN, Inc.
CAPS Department
901 Explorer Boulevard
Huntsville, Alabama 35806-2807

Carrier Networks Division
901 Explorer Blvd.
Huntsville, AL 35806